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XLVIII.

THE AVIATION SERVICE OF THE MEDICAL DEPARTMENT OF THE ARMY.*

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WASHINGTON.

It is now just a year since we were all assembled here facing the beginning of our part of the war. If you will remember, two problems were uppermost in our minds at that time: (1) How to utilize the men who had specialized in medicine so that their special services would not be lost by placing the round peg in the square hole. How this has been accomplished you are in position to judge. (2) How to organize an efficient aviation medical service. As it exists today, there is a large number of medical officers and enlisted personnel of the Medical Department serving with the Air Service.

It is the desire here not to treat the whole problem of the Aviation Service, but to take up the question of the vital care

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that should now be given to the individual aviator if we wish him to fulfill our expectations for him when flying over the lines. It is my desire to bring briefly but clearly to your mind what has been forcefully brought to our attention while recently in France as to the need of special medical care for the aviator. An opportunity was given both Major (now Lieut.-Col.) Isaac H. Jones and myself by the commanding general to see what is actually being done by Great Britain, France and Italy towards maintaining an efficient flying force. It is our desire to have you look beyond the building of machines and the enlisting of men for the aviation service and go a step further into a development which is even more recent than the art of flying. It is one thing to build machines and train men to fly in them; but another to maintain these men and machines in the air by the constant supervision necessary. This is a farreaching problem, which is intimately involved in the evolution of the air service, and largely falls upon the medical service to keep these fliers at their greatest efficiency.

Bear in mind the three general subheads under which the Medical Division of the Aviation Section was endeavoring to send the maximum number of fliers over the top and to send them over in the best physical condition to accomplish the purpose. After all, it is the human machine that controls the situation. France today mourns the loss of many of her best fliers, which she describes as "Aces." Great Britain has suffered in a similar way, and has taken a decided stand in specially protecting her fliers while on the fighting line. She now realizes that her honor rolls, which are usually hung up in each squadron headquarters, are too often a measure of failure, not of the aviator, but of those responsible for his fitness at the time of his crash.

The three subheads are:

First—The selection of those suitable for flying;

Second—Their classification from a medical standpoint for duty with observation squadrons, fighting squadrons, day bombing and night bombing; and

Third—The maintenance of each aviator at his maximum efficiency.

What we have done, or are trying to do, I will try to briefly describe.

In the selection of prospective fliers the Medical Division has been able to carry out the physical examination by trained examiners in different centers throughout the United States. Thousands of men have been examined, from whom were selected a body of men who today, physically, have no equal in this or any other country. And further, we have enough to lend our allies a considerable number should they need them.

Having now aided in this selection of aviators, it has been found out that our real work has just begun. These men are either in France or in this country, actually flying or undergoing instruction. It is not enough nowadays simply to be a normal man to be fitted equally well for the different types of flying now demanded. High as the standard has been, we now realize from the work abroad, that we can go a step further and determine just what type of flying an individual is physically best fitted to perform. The question that confronts us is how can we determine as early as practicable just where each pilot belongs. Certainly not by guesswork, individual impressions, nor by the fact that a pilot does not return after a flight.

It is fully realized that the final test comes in the air, but it is even more fully realized that the first test should not be in the air but by the most careful examination possible as early in the course of training as it can be carried out. As an example, to make a pilot with a poor light sense (his vision otherwise normal) fly at night is suicidal; equally so to compel him to do altitude flying when it can be shown to a certainty that he will faint on reaching ten to twelve thousand feet. If these pilots were properly classified the man with the poor light sense but otherwise normal should and would be able to do satisfactory service as a day bomber; the pilot who, otherwise normal, could not fly at an elevation beyond ten or twelve thousand feet, might well be able to do efficient service in an observation plane which is not intended nor able to ascend to these altitudes. These examples are mentioned to direct your thoughts as to how very practical research of this character can be made.

Finally, it is not enough to select a flier and then to classify him unless he is to be maintained at his maximum efficiency. It is here that the trained medical man, as an adviser to the commanding officer of each aerodrome or flying school, can give that same close supervision to the human machine that is now given to the aeroplane itself. In 1915 there were many accidents in the Royal Flying Corps due to physical defects of the pilots. When this became known, the physical entrance requirements were made more rigid. The rate fell rapidly in 1916, and still further in 1917. No country can afford to sacrifice its fliers from causes which are preventable.

In order to carry further this maintenance of the efficiency of every flier in the Air Service, authorization was obtained for the creation of the position of flight surgeons and physical directors. A flight surgeon is a medical officer whose duties will be to have charge of all that pertains to the physical well being of the cadet flier. Many of the flying schools have already been provided with flight surgeons. Medical men to fill these positions are most carefully selected, with a view to their special fitness for a class of work which requires good medical training, excellent judgment and special knowledge of the medical problems involved in the flying service. After selecting prospective flight surgeons, they are sent to the Medical Research Laboratory for intensive training and then to a flying school. Before long every flying school will have a flight surgeon.

The physical directors are being selected from the well known coaches, physical directors and trainers of our various colleges. These directors are taken in as First Lieutenants in the Sanitary Corps, sent for a short time to the Medical Research Laboratory for a special course, and then on to the flying schools. Their duty will be as assistant of the flight surgeon in everything that relates to the training of prospective fliers, and to occupy a position to the flier similar to that which they occupied in athletics in the various universities from which they come.

You will see from the foregoing that the personnel of the flying schools will be treated very much as an athletic section of a university, with the flying instructors acting in the capacity of the coach, the flight surgeons as athletic or team sur-

geons, and the physical directors, as physical directors or trainers. It is the purpose so to regulate the lives of the cadet fliers that they will be in good condition at all times, neither undertrained nor overtrained. It is realized that the game to be played is not one of a day or a season but of years, and their condition must be made to conform to this extension of the time limit.

It is proposed to have the Food Division in the Surgeon General's office supervise the diets at the flying schools. The importance of the training table is too long established in connection with our various athletic teams to require any urging on my part of its great need.

Early in the organization of the Aviation Division of the Medical Department it was seen that many of the problems would require a very efficient research board to help to solve them. Such a board was created about a year ago and has now extended its functions by establishing laboratories at many of our flying schools. The main laboratory will naturally do most of the research; the branch laboratories will be largely concerned in classifying our fliers.

The above sketch has been given with a view to presenting in a brief way the special features involved in the flying service, which is entirely different from other branches of the military service. Because of these differences, the Medical Department assigned to duty with the Air Service naturally, in addition to the usual difficulties involved in caring for a body of troops, was compelled to deal with these special and unknown problems in addition. Our losses from accidents in the air so far have remained small. It is expected that the medical organization will not only be able to lessen these but will prove invaluable on the other side, where our fliers naturally must operate under most exhausting conditions.

XLIX.

OTOLARYNGOLOGY IN THE ARMY MEDICAL SERVICE.

By Major Norval H. Pierce, M. C., U. S. Army,

Chicago.

Mr. Chairman and Gentlemen—In the synopsis you will see that I begin my remarks under the heading of the personal equation. That which I have to say under this heading is in a way an answer to the many inquiries that have been made to me by men not in the service.

Military discipline has for its purpose prompt, complete, efficient obedience; from "Reveille" to "Lights out" this military influence, which has that purpose, is felt by each man that enters the service. You can readily understand that a group of men suddenly entering this changed environment from civil life will react variously. It has, therefore, been considered necessary that among the qualifications of an efficient medical officer "adaptability" is the one which scores for or against a man. Some men become very unhappy at the beginning of their service; some less unhappy, but the majority take to military life with a hearty good will. But it does not take long before the machine grinds us all down to a certain degree of polish—because it is polish—and I want to say right here that the men who have been in Camp Grant for nine months are now to a man, pretty nearly, not asking the question, "How can I escape?" but "Shall I stay in the service after the war is over?"

There is an immense fascination in camp life. It is remarkable how very soon you become completely separated from the old civil habits. There is a kind of monastic quality about cantonment life. You will be surprised when I tell you that during the last winter, which you know was very severe, there were weeks when men—medical men—never left the confines of the camp. Their whole life was taken up with the treatment of sick soldiers and the study of medical problems, and the time passed like a dream. We live with

our sick there, we had them with us all hours of the day and night, and the best of it is we were with them. We could go to the wards at any time, we could discuss the medical problems at meals, through the evenings, in barracks. At hand there were completely equipped laboratories with a first class chief, there were lectures, there were clinics, there were quizzes—a whole life full of this study of disease, and it has had a tremendous developmental effect on these men. They have advanced as they could not possibly have advanced under ordinary civil conditions in many times the months that they were out there. Do not fear to come into the military family. If you are one who enjoys comradeship—and who does not—you will find in camp life the conditions that bring it to richest fruition.

If I were called to tell what I considered the best thing in a medical sense that I got out of my experience at Camp Grant I would say that it is the realization of what efficient results may be attained when medical experts really work together. Departments there have been in close cooperation. We have had a wonderful personnel at Camp Grant. We all think that our particular personnel is the best of any camp in the country. This body of men has worked together in the finest kind of cooperation, we have discussed frankly all kinds of cases, so that now we no longer regard a meningitis as something that comes only from a suppurative ear. We have an entirely different conception of air borne diseases. We no longer regard the nose merely as a harboring place for catarrhal disease. We realize more vividly now that the problem of disease of the upper respiratory tract is much greater; it embraces scarlet fever, diphtheria, mumps, measles and pneumonia. I would say that this broadened view is probably the best thing that has come to me out of my experience. I trust that the other departments have felt the enlightening influence of the Department of Otolaryngology.

Now, to get down to the otolaryngologic problems proper, the first point to consider is the proper conception of the function of the otolaryngologic clinic of a cantonment. A base hospital otolaryngologic clinic may be built up just as one might build up a private practice. One may be ambitious to have a large number of patients, to which end it might be

largely a matter of applying sprays, douches, ear inflations in multitudinous incidental, inconsequential affections. I cannot say that that has been the policy at Camp Grant, first, because I believe it is unavailing in its therapeutic results, and second and very important, because it takes the man away from his military training. A cantonment in war times is a place where the first object is to train soldiers to military efficiency in the quickest possible time. If you have soldiers coming up to the outdoor department of the base from their commands, which are situated miles distant from the hospital, because of slight catarrh, because of this, that or other slight disease or inflammation of the nose or throat you are taking them away from their duties, and you are interfering with their military training. This is also true of those cases that really require treatment, namely, suppurative disease of the ear and chronic purulent processes in the accessory sinuses.

Medical chiefs have all had a pretty free hand, I must say, in the development of various departments. Our policy at Camp Grant has been to have as few men come into the clinic as possible. If a man has a chronic suppurative ear, he had better not be sent to a cantonment, because a cantonment is not the place to do radical operations of this kind. These operations should be either done at military hospitals which have to do with special reconstruction work, or better, they should be operated on in civil life before they are enlisted. Men with dry perforations of the ear drum have proven a source of contention. When a man is exposed as a soldier must be exposed, to the inclemency of the weather and to fatigue, a dry perforation almost invariably becomes a wet perforation and the ear begins to discharge. This holds as regards large central perforations as well as small marginal perforations. Quite a percentage of patients coming to Camp Grant Infirmaries have been men who have had in the past dry marginal or central perforations. Fortunately, we have a way of disposing of these men now, as they can be enlisted for special service only. They are not sent abroad; they are used in this country in whatever field they are best adapted.

It would be a great mistake to send a man away from the army who is a good electrician or a good carpenter or a mechanic of any kind, because he has a running ear. He should

be retained in the service where his special skill is most needed and where his affliction can have better care than it could in civil life. The department has comparatively recently taken this view of the matter, and the matter has been most intelligently adjusted.

Another point which should be taken up is that of otosclerosis. No difference whether the otosclerotic has hearing sufficient to pass the examining board or not, he should not be taken into the army for full military service. The medical men examining these cases should have proper appliances for the diagnosis of these cases, and they should never be accepted for full military service, no difference at what stage of the disease, because my experience in camp this winter has accentuated a fact that has been well known for a long time, that fatigue and exposure or overheating of the body are very deleterious to these cases, and a number of the men who in the beginning had only a slight deafness from otosclerosis, at the end of the winter were markedly hard of hearing.

The operative work at Camp Grant has been largely of a minor character, consisting mostly of tonsillectomies and corrections of septal deviations. We had only about thirteen cases in which the mastoid was operated on for acute mastoiditis. I say this with a great deal of pride. It is in strong contrast to the experience of some of the other cantonments, which have had a couple of wards full of acute mastoiditis cases which have been operated upon. This is not because we have had no streptococcus infection; it is not because we have had a different streptococcus infection; it is not because our men have had greater resistance to disease—at least, it is not to be altogether explained by any of these circumstances. It is largely to be explained, first, by the correlation of our working force. For instance, one of my officers has for his duty the daily inspection of the wards for contagious diseases, so that whenever an otitis media developed in these cases, as you know they do very frequently, it was immediately detected and a very early myringotomy was performed. We never waited for rupture; we did an early paracentesis if there was any possibility of there being fluid in the ear. We did not wait for bulging. This was done

under strict antiseptic precautions. The external auditory canal was disinfected and washed, then painted with iodin and then an ample myringotomy performed. After the tympanic membrane is incised, a fifty per cent alcohol dressing is placed over the ear and mastoid region. The ceaseless, painstaking care of these cases contributes the first reason why we have not had many mastoids that came to operation.

The second reason was that we used the accumulated knowledge of otology in recognizing the fact that it takes three weeks in nearly all of the cases for decalcification to take place in the bone between the pneumatic spaces. There has been but one case operated there within the first week, and that was a fatal case. It was a case of primary isolated thrombosis of the jugular bulb. This soldier had a recrudescence of an apparently mild otitis media and was operated on the day after his entrance into the hospital, and even at that time there was a cordlike swelling along the jugular very nearly to his clavicle. On opening the mastoid there was no softening; the bony wall of the sinus was normal, as was the membranous sinus, and therefore the operation of the mastoid had nothing whatever to do with his demise, nor would it have had anything to do with his recovery had it occurred. The day after the operation the thrombosis had extended to his arm, so no difference what kind of an operation is performed in such a case, the result is hopeless. With that exception we have had no deaths from otitic disease. This experience, together with that of a long series of years at the Illinois Charitable Eye and Ear Infirmary has proven to me that early operation on the mastoid is very rarely indicated, and then only when there are complications threatening the involvement of the neighboring structures.

We have examined some two hundred aviators, balloonists and observers. I wish to say that I regard the position taken by some recent writers that the examination of the static apparatus is very reprehensible if not altogether unnecessary and unduly accentuated. I cannot understand why we should not find out whether an aviator's static apparatus is in working order, just as much as we should ascertain whether his visual apparatus is normal or not. That we may discover other tests that may be highly useful and supplementary, I

do not doubt; but if we were to abandon the tests as now carried out to ascertain the functional ability of the static apparatus in applicants for aviation service, we would be doing a dire wrong to the men who go into the air.

Now, otolaryngology is very important in the work at Camp Grant, but we do have to do a lot of other things that give the day a great deal more meaning and color than it would otherwise have, such as drills, setting-up exercises and administrative work. Some of our otolaryngologists have turned out to be A1 administrators; some are turning out to be first class drillmasters, and some men divide their spare time between the two vocations.

Abroad I believe there will be a very valuable field for the otolaryngologist, especially when the units working on the head surgery are developed. There is no doubt that the rhinologist and otologist can give very valuable information to the brain surgeon, and injuries of the neck which involve the trachea and larynx can best be dealt with by the laryngologist.

L.

EARLY LARYNGOLOGY IN PHILADELPHIA.

By J. Solis Cohen, M. D.,

Philadelphia.

When returning to Philadelphia after the close of the Civil War I began to resume practice, I took up the study of laryngology as a specialty at the suggestion of my friend, Dr. Elsberg, of New York, beginning with Morell Mackenzie's little volume on The Use of the Laryngoscope, as a textbook. I became one of the outdoor visiting physicians of the Northern Dispensary, and that gave me the run of the dispensary itself for opportunity to practice the art.

After a little while I became able to get a good view of the larynx, and I well remember how, at my first success, I felt as though I was in communion with my Creator, seeing the hidden parts of the economy.

I had a number of friends in the dental profession who took an interest in my efforts on account of the similarity of the laryngoscopic mirror to the dental one. It was during the early days of the use of nitrous oxid gas in dentistry, and some of these men used to give the gas themselves. They would allow me to use the mirror on their patients during the interval between the withdrawal of the teeth and the coming to. I sought to induce them to use the reflector on dull days but they did not take to it. In this way I acquired considerable skill in the use of the laryngoscopic mirror, and sometimes got a case to treat. Some of these cases I exhibited at the meetings of the Northern Medical Association, and thus gradually had paying cases referred to me. As my practice increased I bought more books, and more instruments as they were required, and some of these cases I published, chiefly in the Medical Record, of New York, for which journal, thanks to my acquaintance with its editor, Dr. Shrady, I had engaged to make extracts for foreign journals in exchange for the journals themselves.

One day Dr. Shrady suggested that I write for the Record a systematic series of articles on Laryngoscopy, which I did, and thus became to be known outside of my own community.

Shortly after, Dr. Bertolet came from Europe, where he had studied the subject, and with his aid and that of Dr. La Roche, who had become interested, I decided to open a private clinic, which I did in Ninth street, opposite the University of Pennsylvania buildings, in a couple of rooms just vacated by the orthopedic and nervous dispensary run by Dr. Thomas Morton and Dr. S. Weir Mitchell, who had removed to their present location.

Most of our patients were sent by my good friend Dr. Slocum, the physician of the Northern Dispensary, but it was a long time before we got any students. It was a little hard to keep the patients, too. Sometimes I had to pay them for coming so that we should not be out of material should we have any professional visitors.

After a while I thought it time to begin a course of lectures, so I rented the use of Dr. Agnew's anatomic room in Chant street, now part of the Post Office building, for two nights a week and got out a prospectus which I tacked up on the bulletin boards of the university and the Jefferson.

I went to one photographer after another to get some enlargements made of laryngoscopic images for purposes of class demonstration, but I could not get them to do it for me. They all thought the pictures were those of the female genital organs and indignantly refused. So I had to go to New York where I found the photographers were not so fastidious, and got some splendid reproductions, which were used successfully for a number of years.

Well, the course was to be opened, and I had sold but two tickets, both to Jefferson men, one of them Dr. Graham, subsequently professor of surgery in the Denver Medical College, and the other to Dr. Watson, of Hot Springs, Arkansas, subsequently a noted practitioner in his own state.

The first lecture was attended by Dr. Watson only, but I did my best and lectured as enthusiastically as though the amphitheater was crowded.

At the second lecture I had no audience, not even the janitor, and just as I was giving up, Dr. Graham came in and I gave him the lecture all to himself. This went on for a week or two, only one or the other showing up at a time, when finally, as I was entering the room I heard the end of a conversation like this: "Hello, Watson, are you attending this course of Dr. Cohen?" "Yes," said he, "and are you?" "Yes, I am, too, but I have always been the only one." "Well," said Watson, "let's come together after this and give the poor doctor a class."

"Well, the thing got around the college, and after that there were always these two, and once in a while one or two more who dropped in to see the doctor who was lecturing at such odds.

The next year I had perhaps a dozen students, and so it went for a year or two, and I wrote a little primer on "How to Use the Laryngoscope."

I used to attend Prof. Gross' clinics to report them for the Medical and Surgical Reporter, who paid me at the rate of five dollars per clinic.

One day Dr. Gross introduced me to his class ironically, as a man who was devoting his energies to a single cubic inch of the human anatomy, and when the laugh he raised had subsided he added, "and some day I suppose some specialist will confine himself to diseases of the navel."

So you see the respect shown to specialists in those days. Later, however, Dr. Gross always got me to lecture on laryngoscopy before his class, and engaged me to write the chapters on Diseases and Injuries of the Air Passages in the last edition of his Surgery.

Shortly after this the university got up a summer course of collateral branches, leading to the degree of Ph. D., and the next year the Jefferson got up a summer course on some practical branches and made me lecturer on diseases of the throat and chest, with the understanding that I should bring my clinic into the building, where it became established in the dark chamber under the amphitheater where the regular clinics were held.

Gradually we forged along until finally quite a respectable clinic was formed, with a very fair attendance of students.

I had a private student at this time attending the university, Dr. Carl Seiler, who, as well as my first assistant, Dr. Bertolet, was a good pathologist, and both were very properly looked upon as leading men in the Pathological Society and for quite a while we four were the only laryngologists in Philadelphia.

A fairly good laryngoscopic joke may be interpolated here. Dr. Seiler was examining a woman's throat one day, and not seeing anything wrong in the larynx, remarked, "I think your cough must be a reflex from an irritation in your womb," and the woman replied, "Doctor, if I'd thought you could have seen so far down I would not have allowed you to put that looking glass in my throat."

Faber's talking machine was brought to Philadelphia, and Faber brought me a letter of introduction from a medical acquaintance in Germany. This talking machine was an imitation of the vocal cords in thin ivory moved by cords, the levels of which were worked by a piano key arrangement, and the artificial larynx was enclosed in a rubber head, the lips of which could be moved and the posterior nares of which could be occluded by means of cords also worked by the piano keys, and so a good many words and short sentences could be admirably imitated.

The faculties of the University and of the Jefferson readily accorded me permission to lecture on the voice at both institutions with this apparatus in demonstration, and I gave one lecture at each college to audiences which filled the rooms.

I was getting better known in Philadelphia, because I had just delivered a course of lectures on acoustics at the Franklin Institute and at the Institute of Technology at Hoboken, when that institution was formally opened.

And so laryngology gradually crept into repute.

I was allowed to give clinics at the Jefferson before the entire class, and I well remember the first time the dental engine was ever used in rhinology.

A physician from India came to Philadelphia to get rid of an obstruction in his nasal passages. It was found to be bony, and the case was referred to me. At that time Bonwill's dental engine was coming into use in dentistry, and I determined to try to bore through this obstruction with it. So I

went to one of my dental friends and he taught me how to use the drill, and consented to come to the clinic and help me if I failed to get through. Dr. Keen was one of the clinical surgical assistants at that time, and he suggested that the great heat of the friction might do harm, and proposed, with my consent, to keep spraying the parts with cold water as I proceeded, which he actually did, and in this way the operation was performed, Drs. Gross, Pancoast, Levis and others being present.

It was in '67, I think, that one of the professors of the University, at the suggestion of Dr. John Atlee of Lancaster, placed his son under my care with a growth of the larynx. I removed several portions with forceps, and the fragments, examined separately by Dr. Da Costa, Dr. Wm. Pancoast and Dr. Woodward of the Army Medical Museum at Washington-were pronounced epithelioma. So I determined to open the larynx and remove it externally, and get my friend Dr. Elsberg, of New York, to come over and help me.

There was a very distinguished audience present, as it was the first attempt in Philadelphia to remove an epithelioma from the larynx, and several surgeons were anxious to see it. There were Dr. John Atlee, the patient's physician, a celebrated surgeon, best known in connection with ovariotomy, a surgeon of the navy, a personal friend of the patient, Professors Gross and Pancoast, Dr. D. Hayes Agnew, Dr. Richard Levis, the younger Drs. Gross and Pancoast and one or two others.

After the larynx was split and held aside by Elsberg, just as I was about to attack the growth, the elder Gross put his mouth to my ear and said, "Cohen, be sure you remove the very atmosphere of the damn thing." I removed it very thoroughly, scraped down to the cartilage, rubbed in acid nitrate of mercury, and then let the edges flop. I did not put in a suture. The man recovered and died twenty years later of apoplexy.

This was the case Prof. von Bergman of Berlin referred to in his account of the case of the late Emperor Frederick of Germany, and said that this was the operation he had intended to perform, and not removal of the larynx, as had been declared by his antagonists.

This was perhaps the most successful removal of a cancer of the larynx of its day.

But there is a still better operation which I devised a number of years ago, in these cases of intrinsic carcinoma of the larynx, and that is not to touch the growth at all, but to strip the cartilage of its inner epichondrium with all the soft parts and then sever the flap with serrated scissors. The vessels from the outer perichondrium supply sufficient nutriment to nourish the denuded cartilage and thus repair the loss.

One day the late Professor Harrison Allen came into my office complaining of conjunctivitis which hampered him in finishing his great work on anatomy which was being published by the Leas, and I said to him, "Allen, let me cure your nasal catarrh, and the conjunctivitis will get well of itself," and he replied, "Why, you can't cure nasal catarrh." "Let me try," I answered, and when he consented I immediately flushed the parts out with the nasal douche and then covered them with a weak solution of silver nitrate. His catarrh gradually improved, his conjunctivitis subsided, he finished his book, and became so enamored with rhinology that he gave up his general surgical practice for rhinology and laryngology, and soon became one of its leading exponents, and acquired such an extensive practice that he had to relinquish his professorship at the university to attend to its demands. He devised a number of operative procedures—most of which, however, have become superseded.

After a while Dr. Seiler was given a lectureship in the university, and did most excellent work there for many years. He conceived the idea of concentrating the saline ingredients of what was known as Dobell's solution for the nasal douche, into a tablet, which in solution should have the actual specific gravity of the blood so as to avoid exosmoses or endosmosis. These tablets have had a world wide reputation and extension. Those on the market are not made in exact accordance with his formula, which is in the hands of Mr. Charles Dodson, an apothecary in Fourth street below Chestnut, Philadelphia.

As in all other departments of practice, both in medicine and surgery, there have been fads and fashions.

We had the nasal douche, a sort of fountain syringe, which lost credit because care was not taken in its use to breathe

continuously through the mouth and thus avoid forcing the liquid up the eustachian tube in the act of swallowing, which produced a good many ear troubles, but it is a good sort of flush used properly and at a sufficiently high temperature. Cold solutions and the act of swallowing during their operation are injurious, and as these precautions are not always avoided by patients, it is best not to use it.

Then we had a great fad of snaring off the posterior tumefactions of the lower turbinates, with the Jarvis snare or some of its modifications, the best of which was that of Dr. Sajous, one of my pupils and one of my successors at Jefferson Medical College.

We had also a long series of operations for sawing off spurs of the nasal septum or of boring through them with the dental and later the electric drill. I don't know how many different varieties of saws were devised from Bosworth's adaptation of the digital saw to De Vilbiss' series for attacking spurs of all varieties of deflection.

So, too, we had a prolonged season of electric cautery work for enlarged turbinates, destruction of morbid growths in larynx, pharynx and rhinopharynx. Great long electric cauteries for removing nasal polypi. Now these methods are used only in appropriate cases, but in the early days of laryngology, in Philadelphia as elsewhere, these methods were used almost promiscuously.

I must not neglect, in conclusion, to state that we formed a laryngological society in Philadelphia in the early '70's, I think. Bertolet, Seiler, Sajous, Allen and a few others, including myself, were members, but it lingered only for a while and gradually died for want of nourishment.

LI.

SURGICAL PATHOLOGY OF THE MASTOID.

By J. C. Beck, M. D.,

Chicago.

The surgical pathology or, more correctly, the pathologic anatomy of the mastoid process takes into consideration only a definite anatomic area, although it is probably never solely involved. Usually the middle ear and at times the internal ear are associated in the pathologic process. Neither of these will be considered in this paper.

The pathologic changes are subdivided in the first place into gross or microscopic and minute, histologic or microscopic. A further division is absolutely essential, and that is acute, chronic and acute exacerbation of a chronic disease. The anatomy of the mastoid process, the bacteriologic elements, the general conditions of the patient as well as his management during an attack of mastoid disease, will determine the pathologic changes. The discussion of these factors are not within the title of this paper, but I would like to say that the radiology, the laboratory, the medical teammate, and hospital practice will go a long way to modify these pathologic changes.

Acute Mastoiditis Gross Changes.—I have divided them into two great classes based upon the study of cases operated upon and examination of microscopic sections. These I have named: (a) Cell route or confluent mastoiditis; (b) Vascular route or osteophlebitic mastoiditis.

In the former we find often an external fistula over the antrum or near the tip, with considerable infiltration of the periosteum. The bone bleeds easily and at times appears darker, due to the edematous and engorged mucous membrane under the thin cortex. As soon as the latter is removed a fair quantity of pus escapes, depending upon the presence of a fistula and type of microorganism present. The bleeding is usually very free (to a novice it may appear as though the

sinus is opened), and the lining membrane usually protrudes through the opening made. The intercellular septa are usually broken down, either over the antral region or the tip, and at times both. Not infrequently in this confluent form there is an exposed area of the lateral sinus, digastric fossa or dura. In the vascular route or osteophlebitic type of acute mastoiditis we find microscopically the tissues overlying the cortex very little changed. The latter bleeds very little if any, and has otherwise a fairly normal appearance. On opening the mastoid we find the bone, however, very red. There is little or no pus escaping. The cells are well preserved, and their lining membrane is not very edematous, in contradistinction to the cell route type of infection. The preserved intercellular septa on close inspection show the marked engorgement spoken of above, and only in a later stage in which a possible secondary infection takes place can one find any exposures of the lateral sinus, although there may be an infection about or within it. It is this form of mastoiditis that has the greatest of percentages of perisinus abscess and sinus thrombosis developing, due to the extension by the venous infection from the bone. The same is true of the other vital neighboring areas, as the dura of cerebrum or cerebellum, the labyrinth, the facial canal and the diagastric fossa. The histologic changes will be described later by the aid of microphotographs.

CHRONIC MASTOID DISEASE—GROSS CHANGES.

From the study of a sufficiently large number of operated cases and the subsequent microscopic examination of particles of mastoid bone removed, I have been able to identify or classify the changes in the following:

1. Osteofibrosis or sclerosis.
2. Osteofibrosis with fistular tracts.
3. Osteofibrosis, fistular tracts and cholesteatomatous infiltration.
4. Osteofibrosis, fistular tracts, cholesteatomatous infiltration, with cavity formation of cholesteatomatous masses.
5. Tuberculous osteitis.
6. Syphilitic osteitis.
7. Actinomycotic osteitis.

8. Reparative osteitis.
9. Foreign body in mastoid.
   (a) Sequestrum.
   (b) Any other substances.
10. Neoplasms.
   (c) Sarcoma.
   (d) Carcinoma.
   (e) Endothelioma.

Gross Pathology, Osteofibrosis.—As the name implies, the mastoid bone is converted into a more or less solid bone. The cortex is hard and bleeds very little. The cells are conspicuous by their absence, and oftentimes not a single cell is found until the antrum is reached. If any cells are present then they are very small and are located in or near the tip. The degree of sclerosis depends a great deal upon the form of the mastoid—whether pneumatic or diploeic. That is to say, that in the latter form osteofibrosis is easier and more complete. The histologic findings of all the chronic conditions will be described later by means of microphotographs.

Osteofibrosis With Fistular Tracts.—Practically the same findings are encountered as in the preceding form, except that a few cells are met with and a number of tracts lined with granulation tissue. The bleeding is also more pronounced. In these cases there is frequently found an exposure over the promontory of the horizontal canal as well as the tegmen, a condition well to remember in the acute exacerbations as causes of brain abscess, meningitis and labyrinthitis. The facial canal and bony lateral sinus wall and other portions of the labyrinth are less frequently the seat of these necrotic areas. These necrotic areas are usually covered with granulations, and it is considered bad practice to remove them, as they serve as protection to further septic invasion.

Osteofibrosis, Fistular Tracts and Cholesteatomata.—Again the same pathologic changes are found as in the previous two varieties mentioned, and in many cases the cholesteatomatous changes are not possible to make out grossly in the mastoid, but are microscopically. However, when the antrum, aditus and attic are exposed, one will be able to remove a considerable mass of cholesteatomatous material. All are familiar with the characteristics of these masses, but they can be

further identified grossly by the Bruehl test by adding a few drops of chloroform, when the mass will turn a yellowish green (cholesterin). The microscope will always demonstrate the characteristic crippled epithelial cells.

Osteofibrosis, Fistular Tracts, Cholesteatoma, With Cavity Formation.—The cavity that is found in these cases varies in size from a small marble to that of the mastoid process and in some cases beyond it. The location of this cavity may be at the tip, over the antrum or continuous with the attic to the antrum, the socalled spontaneous radical mastoid operations.

Pressure atrophy of the bone due to the continuous formation of epithelium in layers like an onion, plus the necrosis due to the infection, is the explanation of this cavity formation. These masses often contain particles of necrotic bone (bone dust). The cavity itself is lined by a glistering membrane known as the matrix, from which the new epithelial cells form. This matrix is not a mucous membrane nor skin, not even an epithelial cicatrix.

Tuberculous Osteitis of the Mastoid.—Grossly this condition cannot be identified except that it may be suspected when the fistular tract formation is very marked, even finding one or more on the cortex. Again, there are often softened areas of considerable size, surrounded by very dense bone. Granulations are also more numerous throughout the process. Actual collections of pus are present, in which, however, I have never found the bacillus tuberculosis.

Syphilitic Osteitis of Mastoid.—This is as a rule a sclerosed process but not eburnated. At times it is entirely softened, containing sequestra of considerable size. The granulations surrounding such a sequestrum are large or flabby and do not bleed very much. The three cases of this type which I have identified with subsequent microscopic examination all had the characteristic of having very little calcarious material remaining in the bone.

Actinomycosis of the Mastoid.—Two cases are thus on record, one by Majochi, and the other I had under my service with Prof. Zaufal and Pathologist Prof. Chiari. We found the mastoid bone, including the cortex, practically riddled with fistulæ, containing thick pus in which there were yellowish bodies (actinomycosis). The bone was quite soft otherwise.

Reparative Osteitis of the Mastoid.—The pathologic process refers to the reoperated cases. The previously exenterated cavity is either filled with granulations, cholesteatomata, or both, or it is lined by the characteristic epithelial scar. The bone of these cavities is as a rule very hard, and the edges or margins of said cavity are thickened and irregular. It always appears (especially if one does the reoperation on his own case) as though the cavity was much smaller than when it was made at the previous operation. Bleeding very free from these granulations as well as the bone. There can scarcely be a description of the various parts of the mastoid, since each case is an entity of its own.

Foreign Body in Mastoid.—(a) In the sequestrated type which is, except in the already described syphilitic osteitis, most frequently met with in children, usually the result of an incomplete simple mastoid operation, especially in the cell route or confluent variety. These sequestra are always surrounded by somewhat healthy granulations, bleeding very freely. The sequestrum is usually very easily dislodged, is irregular in shape and has the appearance of being the part of several cells. At times these sequestra are very small, flat, with very pointed extremities. (b) As to other foreign bodies, they may be shots of bullets, shell fragments, parts of instruments, knife and scissor blades. Surrounding such foreign body is usually an infected area with or without granulations, depending upon the length of time that the foreign body has been in the mastoid.

Neoplasms of Mastoid.—All the three varieties, sarcoma, carcinoma and endothelioma, I have had, but they were always the results of these growths in the vicinity of the mastoid. In the case of sarcoma it was a case of retromaxillary tumor that finally involved the mastoid process. In the carcinoma it was the result of a progressive epithelioma of the external ear, and in the case of endothelioma it followed a primary growth of that nature from the middle ear. The gross pathology was that of malignant disease of bone anywhere in the body, except that it was complicated by secondary infection.

The microscopic changes are also those characteristic of sarcoma, carcinoma and endothelioma. The type of endothelioma in this particular case was endovascular.

LII.

A NEW CAMP DISEASE OF THE LARYNX: "PNEUMOCOCCUS ULCERATIVE LARYNGITIS."

By Frederic D. Owsley, Capt. M. R. C.,

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Since my assignment to this hospital, December, 1917, we have had in the otolaryngologic section, a form of laryngitis heretofore undescribed in the literature.

In February, 1918, I reported seventy cases to the Surgeon General, U. S. Army. Since then I have had fifty additional cases.

This is a laryngitis showing ulceration of the vocal cords in the initial stage of the disease. The laryngeal picture at the onset is that of a bilateral ulceration of the mucosa, usually with symmetrically opposed patches on the anterior third of the cords. These patches are generally eliptical in shape, stiuated on the superior surface of the cords, involving their free border. This anterior position is not constant, however. In some of the cases I have found the ulcerations on the center of the cords, but their predilection for the anterior third is so constant that one may describe it as characteristic of the disease. While in some, the ulceration may extend so far as to involve the entire free border of the cords from the anterior commissure to their arytenoid attachment and may ascend above to the ventricular bands and descend below to the subglottic structure, I have never seen it extend posteriorly beyond the arytenoids.

The great majority of these cases (85 per cent) have shown a plaque form of ulceration with grayish patches, with a preference for the anterior half of the cord at all stages. On account of their anterior position so close to the anterior commissure, they may be easily overlooked in cases with an overhanging epiglottis ,as these ulcerations in the beginning are from but five to seven millimeters long.

Etiology.—The predisposing causes are the same as those of other inflammations and infections of the mucosa: Lowered

vitality, following debilitating diseases, such as measles, pneumonia, mumps and bronchitis, which have largely prevailed in this camp.

According to the histories, the majority of these patients are among those who have been camping out on the rifle or artillery ranges or who have taken the thirty mile hikes to and from them, during these Texas northers. Eighteen cases gave a history of measles, two or three weeks before the attack; three, of pneumonia, and three of mumps; the remainder traced their origin to exposure, to the sudden extreme falls of temperature, from 20 to 60 degrees, and high winds accompanying the northers. However, I think I can claim a specific local infection as the real cause, in conjunction with these predisposing elements. In forty cases I was able to obtain laryngeal smears from which to have cultures made. These have shown that the pneumococcus was the only constant and predominant organism present. The streptococcus, staphylococcus and micrococcus catarrhalis were present in some and absent in others. In four cultures we found pure pneumococcus. The natural difficulty in obtaining laryngeal smears without contamination with the habitant organisms of the pharynx when the applicator is withdrawn, must be apparent to anyone who has tried it. This probably in some measure accounts for the mixed organisms.

These findings and my conclusions are, I think, supported by the large number of pneumococcus infections prevailing at Camp Travis during the winter and spring. We have had in our base hospital, in about four months, 1,139 cases of pneumonia, 600 of pneumococcus conjunctivitis, a large number of pneumococcic middle ear infections, pneumococcic meningitis and pneumococcic tonsillitis, so that finding a localized and independent pneumococcic infection of the larynx merely adds one to our pneumococcus group of diseases.

Symptoms.—The first and practically only symptom in nearly all cases has been aphonia, or hoarseness; 85 per cent have been aphonic when first seen, whether their trouble had been of a few days' standing or of one or more months; the remaining 15 per cent have had hoarseness as the first symptom. The usual assurance of nearly all is, "I have no sore throat." A great many have complained of severe night

Fig. 1.

Fig. 2.

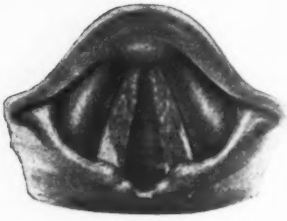

Fig. 3.

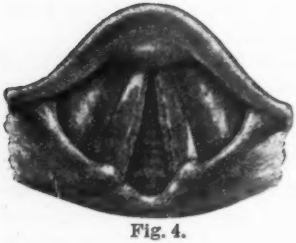

Fig. 4.

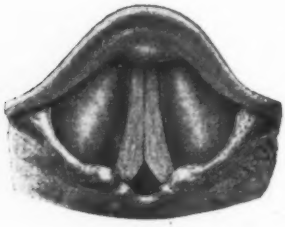

Fig. 5.

Fig. 1. Ulcerations on the anterior third of the cords.
Fig. 2. Ulcerations on center of cords as in Laryngeal Syphilitic Plagues.
Fig. 3. Ulcerations of three months' standing without treatment.
Fig. 4. Ulcerations, diffuse form, along free border of cords.
Fig. 5. Paresis of arytenoideus muscle, with aphonia continuing after disappearance of ulcerations.

attacks of paroxysmal coughing and expectoration of a thick tenacious mucus exceedingly hard to loosen.

These cases were considered as simple laryngitis by the regimental surgeons, who expected them to clear up in a few days or in a week or two at the most. As there seemed to be no constitutional involvement, the aphonia, even when prolonged, excited no special notice; many of these cases were of a month or more standing before they reached the clinic. Some of six months' duration are still aphonic.

The appearance of the cords varies with the symptoms present. When there is aphonia, the ulcerations are confined to the anterior half of the cords; they are bilateral, circumscribed, eliptical in shape, and cover the upper surface of the cords and their free borders. When hoarseness is present the ulceration is much more extensive, frequently running from the anterior commissure along the cords to their attachment to the arytenoids. This difference in symptoms is explained, I think, by the fact that when the ulcerations are located anteriorly and are smaller and more circumscribed, the exudate following the infection and ulcerative process is confined in the submucous connective tissue and muscular strata, whereas when the entire free border of the cords is ulcerated, the drainage of the toxic or inflammatory products is more complete, therefore the more extensive ulcerative process gives rise to the milder appearing symptom, hoarseness, instead of aphonia.

Diagnosis.—The laryngeal picture determines the diagnosis; the presence of ulceration distinguishes it from simple laryngitis.

There is much difficulty in differential diagnosis from laryngeal syphilis, which has an almost identical clinical picture. The first case seen was unhesitatingly diagnosed as syphilis, as the eliptical shaped twin plaques were on the center of the cords and presented the typical appearance of the syphilitic laryngeal plaques, first described by French laryngologists. There was a history of syphilitic infection seven years before in this case, but there were no confirmatory lesions in the throat or on the body. Wassermann proved negative. Since then the large number of these cases following in rapid succession, with their distinct characteristics, have

made diagnosis comparatively easy. The absence of the history of syphilitic infection, the absence of any associated syphilitic lesions, and the sudden aphonia and marked predilection of the ulceration for the anterior third of the cords in the majority of the cases are determining or at least influencing factors, and taken with the prevalence of pneumococcic infections are of sufficient weight to determine the diagnosis.

The almost constant selective affinity of tuberculosis for the posterior segment of the larynx should differentiate it from this disease, in which the anterior sector is usually affected, while the arytenoids are free.

After five months' observation of this disease, I find it difficult to divide it, either from the symptoms or its laryngeal picture, into acute, subacute or chronic stages. After it has existed but a few days, it shows on examination a well developed picture of the circumscribed anterior ulcerations or the ulcerations extending along the free border of the cords from the anterior commissure to the arytenoids. The length of time it has existed seems to make in most cases but slight difference in the extent of the ulceration. It does, however, make a great difference in the prognosis. Many of these cases have come to the clinic with a history of two or three months' aphonia without any treatment, and still the ulcerative process would be no more extensive than in those which were of but a few days' duration.

Prognosis.—In the first report to the Surgeon General in February, 1918, I wrote as follows: "After only two months' observation of this disease I cannot treat of it as a possible chronic condition, which I fear it bids fair to develop into, in many cases which come under observation and treatment after the disease is already of a month or more standing."

In cases which came to the ambulatorium in the initial stage the first few days, or even the first two weeks, the ulcerations disappeared after a short course of local applications, and with the disappearance of the ulceration the normal voice returned. In those which were of a month or longer duration before coming under treatment, it required a month or more of local treatment before the ulcerations cleared away. After their disappearance the aphonia remains persistent, and in many cases the cords appear infiltrated, and their free borders are

irregular where tissue destruction has taken place. The prospect of the complete restoration of the normal voice seems questionable.

Out of thirty-five old cases which have been under treatment for two months, the ulcerations in all but five have disappeared, ten have regained their voice, the remainder are still quite aphonic."

After three months' additional observation I shall have to qualify in a measure some of the foregoing observations. After treating these old remaining aphonies for several weeks locally with astringent and stimulating applications without results, I employed stimulation by electric currents with excellent results. All the old aphonias, even those with the worst cords, cleared up with complete restoration to the normal speaking voice, with the exception of a few cases.

These cases of chronic aphonia, if it may be so called, after five or six months' duration, present, with few exceptions, the same laryngeal picture. The mucosa of the cords is congested, as in chronic laryngitis; the cords approximate through their length back to their attachment to the arytenoid cartilages; from this point back to the posterior laryngeal wall there is a triangular space between the arytenoids. This picture shows that the adductors of the larynx are working normally, with the exception of the arytenoideus transversalis, which by its action normally draws the arytenoids together and completes the closure of the glottis. The paralysis or paresis (as you may choose to call it) of this muscle, leaves the triangular space between the arytenoids open, with the resulting aphonia.

Why this one muscle of the vocal group should remain, in some cases, so persistently paretic, is most difficult to understand. It is the muscle most distant from the seat of the original lesion, it is outside of the laryngeal box, situated on the posterior surface of and attached to the arytenoid and cricoid cartilages. I hazzard the suggestion that the filaments of the recurrent laryngeal nerve which supply this muscle must pass through, in reaching its final distribution, the area of the original lesion, where either by pressure of exudates or toxic action, it is affected more seriously than the other vocal muscles.

Treatment.—The only local application that has shown favorable results on the laryngeal ulcerations has been nitrate of silver solutions—beginning with a 2 per cent solution for the first week, applied every other day, and then increasing it to 5 per cent, if the ulcerations have not disappeared. In some few particularly stubborn cases, where the ulcerations failed to clear after a month's application of this strength, I have used electric stimulation with the interrupted faradic current. It has restored the muscular activity and voice in nearly all these aphonias. After a few applications given every second day, even the oldest cases' voices began to reappear. It was only a matter of a couple of weeks' use of this means of muscular stimulation before all but a few of these cases had their voices entirely restored.

When hoarseness without aphonia is present I do not advise against the use of the voice. I believe that exercise given the cord muscles is necessary for the preservation of the muscular tone, and that prolonged lack of use is partially responsible for the continued aphonia after the infection has disappeared.

LIII.

THE VALUE OF EAR EXAMINATION TO THE NEUROLOGIST.

By Isaac H. Jones, A. M., M. D.,

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The internal ear has such an intimate relation with the central nervous system that its study is of especial interest to the neurologist. The ear tests are of particular value in making a differential diagnosis between labyrinth and intracranial lesions and in furnishing additional data in intracranial localization.

It is well known that nystagmus and vertigo, with loss of equilibrium, associated perhaps with nausea and vomiting, may be produced either by a disturbance of the internal ear or by an intracranial lesion. In many instances the symptoms of internal ear disturbances and of a cerebellar lesion are identical. It is in such a differentiation that the ear tests are often invaluable. It not rarely happens that a careful neurologic study indicates a lesion of the cerebellum, whereas the ear examination, by giving additional data to the neurologist, demonstrates conclusively that he is dealing with a lesion of the labyrinth.

A differential diagnosis between peripheral and central lesions by means of the ear tests depends on certain general principles. A peripheral lesion, of the labyrinth or eighth nerve, is suggesetd by the following:

1. An impairment of the function of both the cochlear and kinetiostatic labyrinth. If, for example, the hearing tests show cochlear deafness and the tests of the semicircular canals show that their function is also impaired, it immediately becomes probable that we are dealing with an end organ lesion.

2. The history or presence of tinnitus; the absence of tinnitus does not necessarily indicate that the end organ is not involved, but its presence is very suggestive of labyrinth involvement.

3. Proportionate impairment of the responses from the horizontal canal and of the responses from the vertical canals.

If, for example, the tests show that the horizontal canal retains only one-half of its normal function and that the vertical canals similarly retain only one-half of their normal function, a lesion of the end organ itself is suspected.

4. Proportionate impairment of both nystagmus and vertigo. If the horizontal canal produces one-third of the normal nystagmus and one-third of the normal vertigo, it is suggested that the lesion is in the horizontal canal itself or in the fibers from the canal within the eighth nerve; if, in addition, the vertical canals produce one-third of the normal nystagmus and one-third of the normal vertigo, an end organ lesion is strongly suggested.

In a word, it is the "proportionate impairment" of responses that speaks for a peripheral lesion.

A central lesion is suggested by the following:

1. A normal cochlea but impaired or nonresponsive semicircular canals.

2. Normal responses from the horizontal canal but absent responses from the vertical canals.

3. Normal responses from the vertical canals but impaired responses from the horizontal canal.

4. Normal vertigo but impaired nystagmus from the horizontal canal.

5. Normal nystagmus but impaired vertigo from the horizontal canal.

6. Normal vertigo but impaired nystagmus from the vertical canals.

7. Normal nystagmus but impaired vertigo from the vertical canals.

8. Normal vertigo and normal nystagmus from any semicircular canal, but impaired past pointing in any direction of any one extremity.

9. Normal vertigo and normal nystagmus from any semicircular canal but an impairment or absence of the normal falling.

10. Spontaneous vertical nystagmus is pathognomonic of a central lesion and is indicative of involvement of the brain stem caused either by their infiltration or pressure. A lesion of the labyrinth may produce many forms of spontaneous nystagmus—horizontal, rotary, oblique, or a mixed nystagmus of

the various types; but an ear lesion can never produce a spontaneous vertical nystagmus, either upward or downward.

11. If there exists a spontaneous nystagmus to the right and nonresponsive semicircular canals of the right ear, an intracranial lesion is suggested. The nonresponsive labyrinth, if the labyrinth itself alone were responsible, would produce a nystagmus to the left.

12. A spontaneous nystagmus of increasing intensity or of long duration is indicative of a central lesion. A spontaneous nystagmus due to a lesion of the labyrinth shows its greatest intensity at the onset of the disease, becomes less and less marked and disappears after a few days.

13. If a stimulation of any semicircular canal produces a "perverted" or "inverse" nystagmus, it is pathognomonic of a central lesion and is indicative of brain stem involvement. Such phenomena as the following are frequently seen: Douching the right ear with cold water with the head back sixty degrees, stimulating the right horizontal canal, should produce a pure horizontal nystagmus to the left. If on stimulation there occurs a vertical nystagmus upward or downward, a rotary, oblique or mixed nystagmus, it may be spoken of as "perverted." If, instead of a horizontal nystagmus to the left, there is produced a pure horizontal nystagmus to the right, it may be termed an "inverse" nystagmus. Neither a perverted or an inverse nystagmus can possibly be produced by a lesion of the labyrinth or eighth nerve; a peripheral lesion produces a poor nystagmus or no nystagmus at all, but an absolutely false response of necessity demonstrates a central lesion.

14. If ear stimulation produces a conjugate deviation of the eyes instead of a nystagmus, it is pathognomonic of a central lesion.

The above outline indicates how additional data may be furnished to the neurologist by the ear tests in determining whether he is dealing with a lesion of the internal ear or of the brain stem or cerebellum. In the broader field of localization, examination of the ear and of the vestibular apparatus is also of distinct value. The particular feature of the ear examination is that the aurist sends in a stimulus to the

brain centers, and then notes the responses of the different parts of the body to this stimulus. For example, by stimulation of the ear there results a nystagmus in a given direction, a pointing of the extremities to the right or to the left, as the case may be, and a falling to the right, to the left, forward or backward as the case may be. Now, if the ear and these central paths from the ear are intact, all the normal responses will appear. If there is a failure of all or any of the responses it is positive evidence of an interruption along that particular path or paths that fail to bring about these responses.

In order to utilize the knowledge obtained from these tests it is essential to have in mind the various pathways constituting the vestibular apparatus. It has been demonstrated that the pathways from the horizontal semicircular canal are different after entering the brain stem from those of the vertical canals; furthermore, that each set of tracts divides into two separate pathways; one pathway, the vestibuloocular tract, is responsible for the eye movement, and the other pathway, the vestibulo-cerebello-cerebral tract, conveys the impulses from the ear to the cerebral cortex, producing vertigo. If the horizontal canal fails to produce both nystagmus and vertigo the lesion indicated is at a point before the division of the horizontal canal fibers into their two separate pathways. Further, if the horizontal canal produces normal vertigo but no nystagmus, the lesion indicated is in the vestibuloocular tract at a point beyond the point of division into the two paths. If the horizontal canal produces normal nystagmus but no vertigo, the lesion indicated is at a point along the vestibulo-cerebello-cerebral path beyond the point of division into the two pathways. Similarly, if the vertical canals produce normal vertigo but no nystagmus the lesion indicated is in the vestibulo-ocular tract at a point beyond the division into the two paths. If the vertical canals produce normal nystagmus but no vertigo, the lesion indicated is at a point along the vestibulo-cerebello-cerebral path beyond the point of division of the two pathways. The ear tests have proven themselves surprisingly helpful in locating lesions in the cerebellopontine angle, medulla oblongata, pons, cerebellar peduncles, cerebellum and various portions of the cerebrum,

including the parietal lobe, the temporal lobe and the occipital lobe.

In order to obtain reliable data from an ear examination, it is essential that the technic of examination should be accurate and painstaking. Since it is primarily an ear examination, the otologist is peculiarly fitted to carry out such an examination. Although our purpose of this paper is to furnish a practical guide for the otologist in undertaking the examination of patients, it is also offered to the neurologist so that he, on his part, may become familiar with the ear aspects of the work, in order to realize the significance of the reactions as reported to him. The ear examination is obviousiy not for the purpose of making a neurologic diagnosis; it merely gives additional information by a series of refined experiments, to the other methods at the command of the neurologist. To be sure, there are many cases in which the neurologist, without the aid of the ear, eye, blood, or other examinations, finds no difficulty in arriving at a satisfactory diagnosis. In these cases, however, it is, of course, useful to have the additional evidence from the ear tests corroborating his neurologic and other findings. In addition, it not infrequently happens, in obscure cases, or in cases in which the neurologic data are meager, that the ear tests may be the only means of furnishing information upon which a diagnosis can be made. For example, an apparently strong, vigorous man, complaining only of headache, showed on examination that both internal ears were normal, and yet the vertical semicircular canals of both ears, when stimulated, failed to produce any responses whatever. The horizontal canals produced normal nystagmus, but no vertigo. As the labyrinths and eighth nerves in this case were unquestionably normal, the nonappearance of the normal responses to stimulation could be accounted for only by an interference with the fibers from the labyrinth within the brain stem. This particular phenomenon complex indicates pressure within the fourth ventricle. This conclusion was recorded with considerable misgiving because a lesion within the fourth ventricle appeared ridiculous, in view of the man's apparent health. That night the patient was rushed to the hospital unconscious. The next day he regained consciousness, but complained of agonizing

headache. Examination by a number of internists and neurologists failed to give any clue of an organic lesion anywhere, and the diagnosis of hysteria was made. Autopsy three days later showed abscess in the fourth ventricle. It is in such cases as this that the ear examination is of the utmost importance, as it gives data absolutely unobtainable by the usual neurologic tests.

Medical Arts Building.

LIV.

TYPES OF MASTOID STRUCTURE WITH SPECIAL REFERENCE TO THEIR DIFFERENTIATION BY MEANS OF STEREORADIOGRAPHY.*

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The mastoid radiogram, considered at one time a fad of doubtful value, has within the past five years come to be recognized as the otologist's "best consultant." The pioneer work in mastoid radiography, begun in 1907, may be said to have been completed by 1912, for, judging by the literature that appeared during that period, several observers had attained results equal to those of the present day. The reason that the profession as a whole has been so slow to recognize the practical value of X-ray findings undoubtedly is the fact that the mastoid radiogram requires a considerable degree of technical perfection, to be a practical and reliable aid in the diagnosis of mastoid infection. Iglauer[2] and Lange,[3] Birkett[4] and Pirie[5] and other pioneers in this field, otologist and radiologist working together, were enabled in large measure to overcome technical difficulties and therefore found the mastoid radiogram to be of considerable value. But so far as the majority of otologists were concerned, useful radiograms were for the most part unobtainable, and the rank and file were compelled to wait till improved technic and apparatus placed this valuable aid at their disposal. During this transition period mastoid radiography was naturally subjected to much adverse criticism, due more to faults in technic than to its inherent limitations.

At the present day a storm of protest would undoubtedly arise should the practical value of this means of investigation

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be seriously questioned, yet in the discussion of everyday problems of middle ear and mastoid infection the possible value of the mastoid radiogram is still little emphasized. In proof of this statement the following may be cited: In December, 1916, a paper was read before the American Academy of Ophthalmology and Oto-Laryngology in which the author[6] gave some detailed replies to three questions sent to leading otologists throughout the country. These questions were as follows:

"In an uncomplicated case of acute suppurative otitis media, how long would you treat it conservatively before opening the mastoid antrum? After opening the mastoid antrum, how long would you wait, provided the case showed no signs of improvement, before performing the radical operation? In an uncomplicated case of acute suppurative otitis media, provided you had not had the care of the case during the acute stage, how long would you treat the case conservatively before performing the radical operation?"

It is not unreasonable to assume that in any one of these conditions the mastoid radiogram might be the deciding factor, either for or against operation; yet in the nineteen replies to these questions, the possible significance of X-ray findings is mentioned but once, and in the discussion that followed the reading of the paper three times, in two instances by men who had not mentioned the same in their replies. Out of twenty-five otologists, who expressed opinions in one way or another, there were four who mentioned the possible value of radiography.

It is also noteworthy that as regards question one, early mastoid operation which, under the conditions stated means exploratory operation, was advocated by three men who did not mention X-ray examination. If radiography has any diagnostic value whatever, it is in determining what is going on inside a mastoid previous to operation. Therefore instead of the slogan, "When in doubt, operate," why not this variation, "When in doubt, radiograph; if still in doubt, operate"?

As stated before, the above discussion gives the opinions of twenty-five otologists regarding three everyday problems of middle ear infection. When taken as a whole, these opinions emphasize the significance of pathology and mention in

detail the means for determining the same; yet in no instance is either the clinical or the surgical significance of mastoid structure even mentioned.

Mastoids differ one from the other as do buildings, which vary in size, thickness of walls and partitions, number, size and arrangement of rooms. Can we imagine a body of engineers attempting to solve the problems of strain and stress that occur in buildings, without taking into account variations in structure? Are we as otologists any more justified in attempting to determine the behavior of mastoids under the strain and stress of infection without also taking into account variations in anatomic structure?

Papers [7] [8] on the clinical significance of mastoid structure have appeared from time to time, and every man who does mastoid operations not only learns that mastoid structure varies, but often discovers at operation how some unsuspected peculiarity of structure has masked or otherwise influenced the clinical picture. Referring again to question one for a concrete illustration, "an uncomplicated case of acute suppurative otitis media," in other words, an otorrhea without other signs or symptoms: the mastoid in this case might either be large with many large pneumatic cells widely distributed, or it might be small with practically no cell structure whatever. Would not definite knowledge on this point enable the observer to predict the clinical course and probable outcome of this case with greater exactness, and would not his therapeutic measures be based more on scientific principles and less on empiricism?

Before the advent of mastoid radiography, there was no means by which the structure of a mastoid could be accurately determined previous to operation; consequently, mastoid structure received little or no consideration as a clinical factor; for while it is true that the size and shape of the mastoid may give some clue as to the underlying anatomy, yet experience has proven that for the most part this is but the merest guesswork. To determine previous to operation the size, distribution and approximate number of the mastoid cells and the location of the sinus, the radiogram is the sine qua non. While this fact has been mentioned in practically every paper on mastoid radiography, yet, for the most part,

these investigations have been devoted more to mastoid pathology than to mastoid structure.

The classification of mastoids into three types, according to cell structure, the pneumatic or air containing, and the diploetic or nonair containing, and the mixed, is the one generally used. To make this classification useful for clinical study and comparison, it must be made more descriptive and sufficiently comprehensive to include such other variable factors of mastoid structure as have clinical significance, among which are the thickness and density of cortex and cell partitions, the number, distribution and arrangement of cells and the location of the sinus. Both the diploetic and the pneumatic mastoid can be divided into three distinct anatomic types, each having both clinical and surgical significance peculiar to itself.

Cheatle[9] [10] [11] [12] [13] has made an exhaustive anatomic study of mastoid structure, and his description of the diploetic types is so clear and concise that to attempt to summarize the same would do his work an injustice. Therefore these types, with such additions and references to actual cases as seem pertinent, will be described in Mr. Cheatle's own words,[11] which are as follows:

"I apply the term 'infantile' to those bones which retain throughout life the characteristics of the outer antral wall and the mastoid mass as seen in infancy (Figure 1). On making a lateral vertical section through the antrum and the mastoid mass in infancy, it will be seen that the outer wall of the antrum is composed of two layers—a thin outer layer of compact bone, and an inner layer of fine cells. These cells are formed before birth; therefore I call them the 'fetal cells' to distinguish them from any which may form in later life, and from which they can be differentiated always by their fineness and inward direction. The mastoid mass is as a rule diploetic, but it may be formed of dense bone (Fig. 2). If the mass is diploetic, a thin layer of compact bone, which can be easily demonstrated by scraping away the diploe, separates it from the antral cavity. There are therefore two types in infancy: one in which the mastoid mass is diploetic and one in which the mastoid mass is dense. Each type may persist all through life, but of course on an exaggerated scale."

Type 1.—"The diploetic type in the adult. In this type the thin outer compact layer of the antral wall has increased in thickness from the periosteal side and is of extreme density; the inner layer of 'fetal cells' is still seen; the mastoid mass is entirely diploetic, and the separating layer between the diploe and the cavity of the antrum is much increased in thickness (Figure 3). Whenever the mastoid process is entirely diploetic the outer antral wall is always formed of dense bone. This type is seen in about twenty per cent of all bones, and it can be seen at all ages.

Type 2.—"The dense form in the adult. In this type the dense mastoid mass persists all through life, but the outer antral wall remains the same as in the diploetic type, the outer layer being very much increased in thickness and of extreme density, while the inner layer of 'fetal cells' is still seen (Figure 4). This form is only seen in about one or two per cent of all bones." In the writer's experience, the cortical surface of mastoids of this type often has a warped appearance due to a deep irregularly triangular depression or wrinkle at the upper posterior border of the mastoid. (Case 2, 3.)

Continuing Mr. Cheatle's description: "The outer antral wall is often of great thickness as well as density in these infantile types. The greatest depth of antrum from the surface is seen in them; it may measure three-quarters of an inch (nineteen millimeters). A forward lateral sinus is usual and is found much more frequently and to a much greater extent than in the cellular types. The sinus often comes well forward below the level of the antrum, and may reach the posterior meatal wall, or it may even dip in between the cavity of the antrum and the surface (Case 1, Figure 5). The antrum may be large or small; if large, the posterior wall may be of extreme thinness and translucency, and may have the cerebellum or lateral sinus, or both, lying against it. In some specimens the posterior antral wall is pushed in by the cerebellum, thus narrowing the antral cavity from before backwards. As in all types, the antrum may be highly placed, or the middle fossa may dip down between either the antral cavity and the surface or external to the superior semicircular canal, causing a low flat antrum."

From this description, the operative difficulties that these

types present are too obvious to require but passing mention. The antrum may be extremely difficult to find, and in the necessary search the sinus, the dura of either the posterior or the middle fossæ, and the facial nerve are all liable to injury.

As regards the clinical significance of these types, Mr. Cheatle says the following: "It is obvious that an acute suppuration in the antrum may exist without any signs behind the ear, as it is impossible for pus to penetrate the outer antral wall or reach the mastoid process, and that there is a great liability for further serious extension, especially to the posterior fossa, if the posterior antral wall is very thin. If intracranial or labyrinthine infection does not occur in acute suppuration there is great chance for the suppuration becoming chronic; the lining membrane of the antrum undergoes destruction and degeneration, or some local destruction of part of the bony walls or ossicles takes place and causes a chronic discharge from the middle ear tract. There is no doubt that the infantile types are found most frequently when operating for chronic suppuration."

This concisely summarizes the possibilities inherent in the "infantile" types of mastoid structure. An acute middle ear and antrum infection, occurring in these types, is likely to run a long subacute course with little or no objective evidence of mastoid involvement. Apart from otorrhea, drooping of the posterior superior canal wall may be the only clinical sign to indicate the necessity for operation (Case 2). As type 2, except in the "outer antral wall," has no cell structure that can be infected, mastoid tenderness and edema is even less likely to occur than in type 1 (Cases 2, 3). Although it be impossible for pus to extend directly from the antrum into the diploetic cells of the mastoid process in type 1, yet experience shows that infection of these cells does occur, probably through the blood and lymph channels. This infected cellular structure is often quite hard, with a more or less gritty feel, and when, as frequently happens, it blends with the diploe of the surrounding bones, the complete exenteration of infected cells is a difficult task (Case 5). The typical signs and symptoms of mastoiditis may all be present in this type and continue indefinitely, with periods of im-

provement followed by relapses, but at no time being as threatening as in the pneumatic types to be described later (Case 5, Figure 6).

Cases are seen occasionally in which there is exquisite tenderness over the mastoid, with or without thickening of the overlying soft tissues, but without any history of otorrhea or any other objective evidence of middle ear or mastoid infection, and if the mastoid be explored, no infection will be found to account for these symptoms. In the writer's experience such cases usually have the infantile type of mastoid structure (Cases 6, 7, Figure 7).

From the anatomic studies above quoted, it seems reasonable to assume that either the diploetic or the dense type of "mastoid mass" is the one present at birth, pneumatic cells being formed by projections of the antral mucous membrane eroding their way into this primary mass or mastoid process. Stewart,[14] by the radiographic study of mastoids in children, has demonstrated that this process begins at an earlier age and proceeds with greater rapidity than had previously been supposed.

As Cheatle's work demonstrates that in twenty per cent of all bones no pneumatic cells are to be found, or, as he would express it, these cases retain the infantile type of structure throughout life, it seems probable that in a certain percentage of all bones the pneumatic structure may be very rudimentary (Figure 8, 9). Both the surgical experience of the writer and the examination of numerous radiograms lead him to conclude that this supposition is correct and that adult mastoids of essentially infantile type do occur in which there is also a rudimentary pneumatic structure represented by a group of three of four large cells at the tip or some other locality. These mastoids have both clinical and surgical significance sufficient to warrant their classification as a distinct type.

Type 3.—The mixed infantile and pneumatic mastoid with the infantile characteristics predominating. Mr. Cheatle apparently refers to this type of structure in the following words: "I wish to say that a dense outer antral wall does not always mean that cells (pneumatic?) are not present in the mastoid. For the outer antral wall may retain this infantile

form, and a few cells may be present along the squamo-mastoid suture (Figure 8), thus closely resembling the pure infantile type; or a narrow tract may pass through the upper mastoid to large cells in the lower or projecting part of the process (Figure 8). A rare condition is for a dense outer antral wall to be associated with a narrow, tortuous tract of cells with very dense walls running through the mastoid. I may say that if cells, apart from the 'fetal cell,' are present in the outer antral wall, they are also present to a greater or less degree in the mastoid."

From the above description it is evident that various combinations are possible. The cell structure of Case 8 possessed most of the dangers inherent in both the diploetic and the pneumatic celled mastoid, with none of the safeguards of the latter type. This case was a type 2 or dense infantile mastoid with an isolated group of large cells imbedded in dense bone over the lateral sinus. Although in one of these cells the infection had eroded the bony covering of the sinus, yet there was no clinical evidence of this fact, the external cell walls being so dense that infection had but one direction in which to travel, namely, inward. Had it not been for the stereo-radiogram, these cells would unquestionably have been overlooked at the operation, with possible disastrous results easily to be imagined.

Case 3 (Figure 10 a, b) demonstrates that the same individual may have a dense infantile mastoid on one side and a pneumatic celled mastoid on the other: a point also demonstrated anatomically by Mr. Cheatle.[13]

Cheatle protests against the term "sclerosed mastoid," as applied to the infantile types. Sclerosis means a hardening due to some inflammatory process; in other words, it is an active process akin to scar tissue formation. While it seems probable that under certain conditions sclerosis does occur in these types (Case 4), yet when the term "sclerosed" is applied indiscriminately to every small mastoid with a thick dense cortex and a fine dense cellular structure, it is evidently a misnomer.

In case 4 (Figure 11 a, b) the normal mastoid shows in the radiogram a well marked pneumatic structure. In the diseased mastoid, there was found at operation a chronically in-

fected antrum of moderate size deeply situated in dense bone that contained no cell structure. As no microscopic sections of the bone were made, it is of course impossible to tell whether the density of bone was due to sclerosis from chronic infection or to persistence of infantile type, or both.

In the X-ray examination of the infantile types the inherent limitations of radiography must be considered. As the radiogram is merely a record of densities, it must always be borne in mind that the dense outer wall of the mastoid tends to obscure the small underlying cells. Where many cells are superimposed, they will show in the radiogram, otherwise they may not be apparent. It is therefore evident that the radiogram cannot be expected to show the exact details of cell distribution, although it will in most instances furnish a valuable clue as to the type of structure.

The radiogram, especially when a stereoscopic study is made, will practically always show the sinus to be far forward in the infantile types. When to this appearance is added a suggestion of cell structure towards the tip of the mastoid and a cellular area just above and behind the middle ear, the remainder of the mastoid appearing dense, in the writer's experience, type 1 is to be confidently expected (Figure 3, 6). When the entire mastoid appears dense, with the exception of a small cellular area, often but a faint suggestion, just above and behind the middle ear, type 2 is to be expected (Figures 4, 5, 7, 11b). When to one or the other of the above findings there is added a small group of large cells, though they be but faintly outlined, type 3 is to be looked for, and at operation the locality in which large cells are suspected should be thoroughly explored (Figure 8).

The pneumatic mastoid can also be divided into three distinct types, the word pneumatic indicating a common characteristic, namely, that the cell structure is essentially air containing.

Type 1.—The pure pneumatic type, practically all of the cell structure containing air. The usual structure of this type is as follows: The whole mastoid, including the tip, is large and well developed; the cortex is relatively thin; most of the cells are large in size with thin partitions, and are uniformly distributed throughout the mastoid (Figure 12). These features

are by no means constant, for occasionally the cortex may be of considerable thickness and density; instead of being limited to the mastoid, the cell structure may invade the occipital bone or the zygoma (Figures 13, 14 a, b); while a large tip is the rule, yet a mastoid with little or no tip development may be entirely pneumatic. As in all types, the sinus is variable, although it is usually found well back and deeply situated.

It is a well known fact that mastoiditis with an abrupt onset of stormy and threatening symptoms, which may as promptly subside under treatment, is a common occurrence in large pneumatic mastoids. In contradistinction to the infantile types, a middle ear or antrum infection can, in this type of mastoid, extend directly into the mastoid cells. On the additional fact that the cells contain air can be based a physical theory to explain the clinical course of mastoiditis in the pneumatic types. As the air in all pneumatic or air containing structures is maintained at atmospheric pressure by a more or less direct communication with the surrounding atmosphere, whenever this communication is interrupted for any length of time, the contained air is absorbed and a partial vacuum with consequent negative pressure results. In an acute suppurative otitis media, the infection, first of all, occludes the eustachian tube, with resulting absorption of air and vacuum formation in the middle ear and mastoid cells. This in turn causes venous engorgement with consequent swelling of mucous linings and outpouring of serum, the objective evidence that "nature abhors a vacuum." A fallow field is thereby prepared for the growth of bacteria, and the infection spreads apace. This is shown clinically by the rapid onset of pain, mastoid tenderness and occasionally edema. Pain and tenderness may be present before there is any objective evidence of infection in the middle ear (Case 10, Figure 20 a, b). It seems reasonable to assume that incision of the drum membrane not only provides drainage for the mastoid but also tends to restore atmospheric pressure and abolish negative pressure in the mastoid cells, this of itself tending to reduce the edema and swelling of the mucous membranes and the general venous engorgement. The ground, so to speak, is thereby knocked from under the infection, and unless the general resistance is too low or the infection too

virulent or too much damage has already resulted, the stormy and threatening symptoms promptly subside and the case recovers, often with surprising rapidity. (Case 9), (Figure 14 a, b). When resolution does not take place, clinical signs and symptoms will usually furnish ample evidence of this fact.

However, experience shows that considerable destruction of cell structure can occur without clinical signs or symptoms, or these signs and symptoms may make their appearance late in the course of the infection. There are two structural possibilities to explain these occurrences. The cell walls may be so thin and fragile that destruction of cell structure causes little or no local reaction, or the signs and symptoms of mastoiditis may be obscured by an unusual thickness and density of cortex (Cases 11, 12).

Cells may extend so deeply into the occipital bone or into the zygoma that, without foreknowledge of their presence, they may be overlooked at operation and failure of healing or intracranial complications result. Figures 13, 14 a, b show how closely zygomatic cells may approach the temporomandibular articulation. Mastoid infection under these conditions could easily invade the joint cavity.

The type 1 pneumatic mastoid is the easiest and most satisfactory of all types to radiograph, for unless the cell structure has been entirely destroyed, the radiogram will demonstrate the exact details of cell distribution and of pathology as well. As pathologic appearances have been well described by previous observers, they will be given but passing mention. An early stage of mastoid infection is indicated in the radiogram by a general haziness and a blurring of cell outlines, with here and there an apparent breaking down of individual cell partitions (Fig. 14 b). Cases with this X-ray appearance may or may not resolve. When resolution does not take place, a later plate will show more disintegration of cell partitions and considerable cloudiness with only occasional fragments of cell outline. Unless the radiogram is of the highest technical quality and the observer not only has a thorough knowledge of mastoid radiograms but also makes a careful study of each individual plate, this latter appearance may be confused with the X-ray appearance of the infantile types

or vice versa, and an entirely wrong interpretation result (Case 3), (Figure 10a, b).

Type 2.—The mixed pneumatic and infantile mastoid with the pneumatic characteristics predominating. From the clinical point of view, the distinctive characteristics of this type would seem to be the presence of sufficient pneumatic structure for negative pressure to play a part in the spread of infection. It is, of course, obvious that in some cases this type cannot always be distinguished by the radiogram from the type 3 infantile mastoid, on the one hand, and the type 1 pneumatic mastoid on the other. Figure 15 shows a cross sectioned temporal bone, whose cell structure is largely pneumatic. In the tip directly under the cortex is a nest of large diploetic cells separated from the pneumatic structures by a layer of compact bone. Figure 16 shows this cell nest as revealed by the radiogram. When viewed stereoscopically its separation from the pneumatic structure is quite apparent. Mr. Cheatle has demonstrated that at birth the diploetic or "fetal" cells of the "mastoid mass" are separated from the antrum by a layer of campact bone (Figure 1). In the above specimen, the pneumatic cells, in their development from the antral mucous membrane, instead of penetrating this original layer of compact bone, have apparently pushed both it and the underlying diploetic cells into the tip.

Although an acute infection occurring in this mastoid would undoubtedly run the same clinical course as in the type 1 pneumatic mastoid, its surgical importance would be greatly increased by the nest of diploetic cells separated by dense bone from the pneumatic structure. Though infection of this cell nest by direct extension and negative pressure be impossible, infection through the blood and lymph channels would be not only possible but probable, and unless infection had eroded the bony partition or the tip were removed at operation, this cell nest might easily escape notice and remain undrained, a possibility at variance with the often expressed opinion that even though all of the cells are not removed at operation, those that remain will have adequate drainage.

Although some photographs[13] of Mr. Cheatle's specimens apparently show a layer of compact bone separating diploetic from pneumatic cells, no general conclusions can be drawn

from the limited material at hand. Whether or not diploetic and pneumatic cell structure is often or always separated in this manner, is a question that cannot be answered without further investigation. As a practical measure it would seem prudent to thoroughly explore at operation every area in which the radiogram revealed the presence of diploetic cells. For this purpose the stereoradiogram is the only reliable guide, as many large cells superimposed may in the single plate simulate diploetic structure (Figure 17 a, b).

Type 3.—The "double decked" mastoid. This term is used at the Massachusetts Charitable Eye and Ear Infirmary to describe those mastoids in which the cells are arranged in two tiers separated one from the other by a bony septum which in location and general appearance often closely resembles the internal table. Case 13 is a remarkable demonstration of the surgical importance of this type.

The writer performed a left mastoid operation about five years ago on a man aged sixty-nine years, referred by Dr. R. S. Phillips, in which this type of structure was well marked. In this case, signs and symptoms of mastoiditis sufficient to warrant operation were slow to appear, and as satisfactory radiograms of the mastoid were then unobtainable none were taken. At operation removal of a very thick dense cortex disclosed a considerable amount of large necrotic cells filled with pus and granulations, the removal of which left a cavity of average size and depth. On investigation of what appeared to be the internal table there was found some areas of softening leading into cells underneath, removal of this false inner table revealing another tier of necrotic cells, which when curetted out left a cavity of unusual depth.

Figure 18 is a radiogram of the normal mastoid in this case, taken recently by Dr. Gerber. The single plates apparently show a mixed diploetic and pneumatic structure which, when viewed stereoscopically, appears to be arranged in two separate tiers one over the other. The outer tier, composed of large pneumatic cells, begins at the cortex and apparently occupies the larger part of the mastoid process, while the inner tier, composed of small diploetic cells, extends deeply into the posterior part of the pyramid. No bony septum can be made out, although one might be present and yet not ap-

pear in the radiogram. As the left mastoid had the typical double decked arrangement of cells, it is quite likely that the same arrangement is present in the right. It is, therefore, possible that this type of mastoid may have the same development as was suggested in reference to the nest of diploetic cells in Figures 15 and 16.

As previously pointed out, in the bone from which these figures are taken, the "fetal" diploetic structure and the layer of compact bone separating it from the antrum has apparently been forced into the tip by the development of the pneumatic cells. Had these cells in their development proceeded directly to the cortex and then down into the tip without penetrating the "fetal" layer of compact bone, the diploetic cells would then have been found in the depth of the mastoid, separated from the overlying pneumatic structure by a layer of compact bone; or had the reverse taken place—that is, had the pneumatic cells occupied the depth of the mastoid and forced the diploetic structure underenath the cortex, we would have, in either event, the "double decked" mastoid. Much more investigation is, of course, necessary to determine if this be the correct explanation for the occurrence of this type.

In all probability this type of structure can never be conclusively demonstrated by radiography. Yet whenever the stereoradiogram reveals both diploetic and pneumatic cells apparently segregated, with one type of cell structure overlying the other (best seen by reversing the plates),[15] the possibility of the "double decked" mastoid should be borne in mind.

As reference has been made from time to time to the necessity of scuring radiograms of good technical quality, it seems well to state briefly just what this term implies. The writer has therefore asked Dr. Isaac Gerber, to whose skill and cooperation he is greatly indebted, to state in a general way how a thorough X-ray examination of the mastoid is made and how the quality of a plate is determined.

"In the radiographic study of the mastoid, plates are generally taken in two projections, the anteroposterior and the lateral oblique. The anteroposterior projection sometimes is made so that both mastoids are taken at one exposure. As modified by Hickey, however, each mastoid is exposed separately on one-half of a plate with the same technic, and with

a very small cone, so that the greatest possible definition is obtained. While the evidence from this projection is limited, still it is important as a supplement to that obtained by the other exposures. A general idea is had of the depth of each mastoid, of the gross distribution of cells and diploe, and of the rough air content of each side. The finer details of mastoid structure and topography can only be seen on the lateral oblique plates. These are taken with the central ray passing through the vertex of the skull at such an angle as to project only underneath the mastoid onto the plate. The usual custom has been to expose each mastoid in this way, often on separate halves of a single plate. If the exposures are made with the same technic, a good opportunity is afforded to compare the details of the two mastoids, side by side.

With single flat plates of this sort, however, the information is much limited. If one side is normal, the study of the diseased side is facilitated; otherwise it is difficult. The contrast between air content on one side and haziness on the other can easily be noted. Destruction or thickening of the cell walls can often be seen. But the finer details of mastoid structure, such as the exact distribution of pneumatic cells and diploe, the exact relations of the sinus, the presence of partly sclerosed cells, etc., all of which are of the utmost clinical importance, can only be obtained accurately by the study of stereoscopic plates of each mastoid. Many points which are doubtful from a study of the flat plate are cleared up with certainty by the stereoscopic study. In short, the advantages of stereoscopic study of the mastoid are those which accrue to stereoradiography in general, and which have caused the marked increase in the use of stereoscopic rather than flat plates wherever practicable.

An estimation of the technical quality of plates of the mastoid region is of extreme importance. When some or all of the mastoid cells are pneumatic, the character of the cell detail will furnish an index of plate quality. In a good plate the normal cells should be definitely black, with sharp and clean cut walls. If there is any generalized disease process, other portions of the plate must be considered in judging quality. The temporomandibular joint, the auditory canal, and the lateral sinus are all regions that must be studied.

They should be sharp and clear cut in a properly exposed and developed plate. The bone of the mandible should show its structure well defined. In addition, the character of the detail of the skull generally and of the sutures is of value. The ability to judge these points is of especial importance when examining stereoscopic plates, as we then have at least four plates developed separately. The use of the Coolidge tube is an aid in obtaining uniform exposures. A complete X-ray examination of the mastoid therefore consists of a stereoscopic set of plates of each mastoid in the lateral oblique diameter, and one exposure of each mastoid in the anteroposterior diameter."

The writer would add, in conclusion, that an X-ray examination of this character and quality will in most instances reveal the type of mastoid, and that this information, irrespective of what pathology may be revealed, should enable the observer to predict the clinical course and the prognosis of a middle ear infection with greater exactness, and place therapeutic measures on a more scientific and less empirical basis. For example, if the X-ray examination shows the mastoid to be one of the infantile types, the observer is thereby informed that in the case under consideration mastoid symptoms may not appear or may be very indefinite, and that the middle ear infection is quite likely to become chronic. Forewarned by this knowledge, he should prevent such a contingency by early drainage of the antrum, regardless of the absence of the classical indications for the performance of this operation. If, on the other hand, the radiogram shows the mastoid to be one of the pneumatic types, the observer should not hasten the patient to the operating table at the onset of stormy and threatening mastoid symptoms, but should remember Schwartze's dictum that, barring unusual symptoms, acute mastoids do not require operation unless the stormy mastoid symptoms continue unabated longer than eight days after incision of the drum membrane; in other words, he should wait a sufficient length of time for the reestablishment of atmospheric pressure within the mastoid cells.

As to the objection to routine X-ray examination, on the ground of expense to the patient, if the otologist is fully con-

vinced in his own mind of its usefulness and necessity, he should have little difficulty in convincing the patient, especially as the average individual has an exaggerated idea of what may be learned from a radiogram and has, besides, a greater dread of a mastoid operation than of almost any other surgical procedure. X-ray examination is not necessarily unavailable for very sick patients in private houses, as Case 12 demonstrates.

The following cases, which have been referred to from time to time, have been selected to illustrate the clinical and surgical significance of different types of mastoid structure, with special reference to their determination by means of the mastoid radiogram.

Case 1.—A forward and unusually superficial sinus, occurring in an infantile mastoid (probably type 2).

Hospital patient, a young woman, aged nineteen years; admitted to the Rhode Island Hospital, October 28, 1917, for a purulent discharge from the right ear, of three years' duration. The stereoradiogram showed what appeared to be an infected type 2 infantile mastoid, with the sinus far forward, the usual location in this type. At operation retraction of the soft tissues revealed a bluish spot about half the size of a dime, at the posterior border of the suprameatal triangle. As this spot gave the appearance of necrotic bone, it was investigated with the bone searcher, which to the writer's chagrin plunged through a delicate film of bone into the sinus, the ensuing hemorrhage necessitating a "strategic retreat." The initial incision was close to the auricle, otherwise the sinus would in all probability have been opened with the first cut of the scalpel. On again looking at the stereoradiogram, the sinus was seen to show with unusual distinctness, due, of course, to the thinness of the bony covering (Figure 5).

Case 2.—An acute middle ear and mastoid infection occurring in a type 2 infantile mastoid.

Private patient, a young man, aged nineteen years, referred by Dr. Halsey DeWolf, April 1, 1915. This case ran a subacute course for a month before it was finally operated. When first seen, patient had had pain in the right ear for twenty-four hours. There were two or three blebs on the drum membrane, but no general redness or bulging. These blebs were

incised, and although the pain did not recur, yet as the drum membrane without definite bulging gradually became red and thickened and a slight serous otorrhea persisted, the drum was incised a few days later. After a week the otorrhea, which remained serous, had nearly ceased, when the pain suddenly recurred, accompanied by distinct bulging of the drum membrane. The incision this time was followed by a moderate mucopurulent otorrhea that neither increased nor diminished. After about ten days some drooping of the posterior superior canal wall developed, this and the persistent otorrhea being the only clinical evidence of mastoid infection. A radiogram taken by Dr. Gerber showed an infected type 2 infantile mastoid, these findings being confirmed at operation.

The cortical surface of this mastoid had a warped appearance, due to an irregular triangular depression or wrinkle about an inch directly back of the suprameatal spine. The cellular structure consisted of a few scattered cells directly under the suprameatal triangle, the rest of the mastoid being entirely dense. The sinus was far forward and was exposed in the search for the antrum, which was very small. The middle ear was entirely dry within a week after the operation, and the hearing which had been much affected promptly returned to normal. It is this type of mastoid, one of the typical infantile types, that is often termed atypical, or sclerosed.

Case 3.—An infected type 2 infantile mastoid on the right and a large normal pneumatic mastoid on the left side.

Private patient, a young man, referred by Dr. James Gilbert, May 27, 1916. Five months previously patient had an attack of "la grippe," at which time an otorrhea developed in the right ear and continued till five weeks ago, when it suddenly ceased. One week ago a swelling suddenly developed in the right side of the neck, just below and back of the ear. The drum membrane was found to be dark red in color and much thickened, but without bulging or perforation. Low conversational voice was heard at two feet. There was a hard nonfluctuating swelling the size of a tangerine just below the mastoid and under the sternomastoid muscle. A radiogram was taken by Dr. Gerber, which was misinterpreted by both he and the writer. As a large pneumatic mastoid was appar-

ent on the left side, this fact together with the clinical history and examination led us to interpert the appearance of the right side as a large broken down mastoid probably filled with pus and granulations (Figure 10 a, b). Patient insisted on delaying operation for a week, during which time the swelling in the neck entirely disappeared.

At operation the warped appearance of the cortex, as described in Case 2, gave warning of a forward sinus, the first chip of bone removed exposing the same. The cellular distribution was exactly the same as in Case 2. Although there was no pus, the sinus was found to be covered with granulations for about two-thirds of an inch. The mastoid wound was entirely healed within ten days, and the drum membrane, which had been incised at operation within two days, the hearing promptly returned to normal. Further study of the radiograms convinced us that had we not been overinfluenced by the clinical history the apparent Bezold abscess and the radiogram of the left mastoid, we would not have misinterpreted the findings (Fig. 10 a, b).

Case 4.—A chronically infected antrum deeply situated in dense bone on the right, a normal pneumatic mastoid on the left side.

Hospital patient, a young lady, aged twenty-six years; admitted to the Rhode Island Hospital April 19, 1917. The right ear had discharged continuously for fifteen years. Three weeks before admission patient had an increase in otorrhea accompanied by pain and mastoid tenderness as a result of an attack of "la grippe," and one week before admission began to have attacks of vertigo, nausea and vomiting, the labyrinth tests indicating that these symptoms were due to pressure and not to labyrinthine infection or fistula. Examination further disclosed a profuse foul otorrhea, a middle ear filled with tough granulations, drooping of the posterior superior canal wall and tenderness over the antrum but no mastoid edema. The radiogram showed a large pneumatic mastoid on the left side, while the right mastoid appeared entirely dense except for a light area the size of a dime just above and behind the middle ear (Figure 11 a, b).

At operation (radical) a large antrum corresponding to the light area was found deeply placed in dense bone that con-

tained no cellular structure, the antrum, attic and middle ear being filled with tough and adherent granulations. No bone was examined microscopically, so it is impossible to tell if the density of bone was due to sclerosis or to persistence of infantile structure or both.

Case 5.—A middle ear and mastoid infection of nine months' duration in a type 1 infantile mastoid.

Hospital patient, a girl, aged fourteen years; admitted to the Rhode Island Hospital October 12, 1917. Mother died of tuberculosis and patient was treated at a camp two years previously for "tuberculosis of the throat," although there are no active signs at present. For the past nine months has had more or less pain in the left ear and a continuous otorrhea. Examination showed a fairly profuse, somewhat foul purulent discharge coming from a large perforation in the anterior inferior quadrant, some drooping of the posterior superior canal wall and well marked tenderness over the entire mastoid. The stereoradiogram showed probable infection of a type 1 infantile mastoid (Figure 6). The symptoms began to subside the day after admission, and at the end of ten days the middle ear was entirely dry, and the mastoid tenderness and drooping of the canal wall had disappeared. Patient was discharged from the hospital and returned five days later with conditions the same as on first admission, pain and otorrhea having recurred the day after leaving the hospital.

At operation the removal of a thick dense cortex disclosed a small diploetic celled mastoid. As the antrum was approached this cellular structure ceased and hard dense bone was encountered. All of the cell structure was hard and resistant and merged posteriorly with the diploe of the occipital bone: the cells in the body of the mastoid and tip were filled with dark red serum but contained no granulations. As there was some bare bone at the entrance of the eustachian tube this case may come to radical operation. At the present writing the middle ear is dry and the mastoid wound healed.

Case 6.—Pain and mastoid tenderness without any other signs of infection, occurring in an infantile mastoid.

Private patient, a young woman, aged seventeen years; seen in consultation with Dr. C. J. Astle. Two years previously had had an otorrhea in both ears, lasting about six

weeks. For the past ten days has had severe pain and tenderness over the left mastoid, with no other signs of middle ear or mastoid infection. A radiogram of the left mastoid was reported as showing evidence of infection sufficient to warrant operation, while that of the right mastoid was said to be too poor a plate to show anything definite. Other radiograms taken a few days later by Dr. Gerber showed two infantile mastoids, both of which were apparently normal (Figure 7). Patient was assured that operation was not only unnecessary but would not even be considered. The pain and tenderness disappeared a few days later. This case shows the danger of basing definite conclusions of X-ray appearances unless both plates be of good quality.

Case 7.—Pain, mastoid tenderness and edema, occurring in an uninfected type 1 infantile mastoid.

Hospital patient, a young woman, aged twenty-one years; admitted to the Rhode Island Hospital. Case reported by the courtesy of Drs. L. B. Porter and H. P. Abbott. This patient had complained of severe pain and tenderness back of left ear for over a week. Examination showed an area of swelling, redness and tenderness beginning about three-fourths of an inch behind the left postauricular fold and extending about the same distance backwards and over an inch downward. There was no tenderness over the antrum or tip, or any other evidence of middle ear or mastoid infection. The radiogram showed what appeared to be a normal type 1 infantile mastoid. Because of the persistence of the pain and tenderness, an exploratory mastoid operation was performed, removal of a thick dense cortex disclosing uninfected diploetic cells throughout the mastoid. The wound was closed without drainage. Pain and tenderness were nearly gone at the end of a week, when the wound became infected and had to be drained. As the wound did very poorly, a stereoradiogram was taken three weeks later that revealed infected diploetic cells in the floor of the cavity overlying the sinus, this X-ray appearance being confirmed at the second operation (Figure 20). At the present writing this case is making a slow but uneventful recovery. This case shows that an exploratory mastoid operation may be attended by bad results, and that a mastoid radiogram, preferably a stereo-

radiogram, is indicated whenever a mastoid wound does not heal readily.

Case 8.—A middle ear and mastoid infection, occurring in a type 3 infantile mastoid.

Hospital patient, a man aged sixty-seven years; admitted to the Rhode Island Hospital August 11, 1917. Hospital record before coming under the writer's observation, reported by courtesy of Dr. L. B. Porter. About two months ago patient developed bilateral deafness over night. For two days had pounding like piston rods in both ears, when both began to discharge a thin whitish fluid, this discharge stopping spontaneously within two days. Since then the right ear has been practically normal, but the left ear has remained very deaf. About three weeks later, patient began to have pain and swelling back of the left ear, both of which have persisted, the pain during the past ten days being so severe as to allow but little sleep. Examination of the left ear showed a drooping of the posterior superior canal, wall so marked that the drum membrane could not be seen, and a large, red, fluctuating swelling over the mastoid, incision of which evacuated a large amount of pus. The radiogram taken later showed probable infection of the left mastoid but no definite details (Figure 8).

Patient remained in the hospital for some time, but refusing operation was discharged to the outpatient department, from where he was readmitted, coming under the writer's care about two months after first admission. At this time examination of the left ear showed a somewhat thickened drum membrane and some drooping of the posterior superior canal wall and a small sinus just back of the auricle, discharging a small amount of pus. Bare bone could be felt at the bottom of this sinus. The stereoradiogram was of such poor quality that the consulting radiologist, Dr. Gerber, declined to give any opinion. While nothing definite could be made out in the single plates, yet when placed in the stereoscope the writer thought he could distinguish a group of large cells some distance directly posterior and a little above the upper margin of the middle ear.

At operation a perforation of the cortex leading into the antrum was found in the suprameatal triangle, together with

a small amount of diploetic structure, the mastoid process below being entirely dense. On exploring the region in which the large cells were suspected four large cells filled with granulations were found nearly two inches posterior and a little above the suprameatal spine deeply imbedded in dense bone, no cell having and apparent connection with any other cell (Figure 8). The deepest and most posterior cell, about the size and shape of a white bean, was situated over the sinus apparently back of the knee, the bony covering of the sinus being absent and the cell containing several drops of thick pus under pressure.

The case made an uneventful recovery, with almost complete restoration of hearing. As the posterior cells in this case were far too large to be diploetic cells, it therefore seems reasonable to assume that this group of cells was a rudimentary pneumatic structure. The radiogram of the normal mastoid shows large cells in this same region and also two or three large cells in the tip (Figure 8).

Case 9.—An acute middle ear infection with well defined signs and symptoms of mastoid involvement, occurring in a large pneumatic mastoid (probably type 1).

Hospital case, a man, aged thirty-seven years; admitted to the Rhode Island Hospital May 8, 1917. Case reported by courtesy of Dr. H. P. Abbott, the radiograms of both mastoids being more striking than any in the writer's collection (Figure 14 a, b). For three days previous to admission patient had complained of severe throbbing in the left ear that made sleep impossible. Examination showed redness and bulging of the drum membrane and drooping of the posterior superior canal wall, and tenderness over the mastoid, incision of the drum membrane evacuating a large amount of bloody serum. Three days later patient complained of much pain and tenderness over the mastoid; evening temperature, over 101°. Radiograms were taken that showed evidence of infection in the left mastoid (Figure 14 a, b). Three days later the otorrhea was purulent and very profuse, the pain and temperature being less but the tenderness remaining the same. Within the next three days all mastoid signs and symptoms had disappeared and the otorrhea had practically ceased, the patient being discharged from the hospital.

This case illustrates how quickly stormy and threatening mastoid symptoms may subside in large pneumatic celled mastoids.

Case 10.—A middle ear and mastoid infection, occurring in a pneumatic mastoid, probably type 1. Disappearance of clinical signs with unresolved mastoid infection demonstrated by X-ray examination.

Private patient, a woman, aged forty-five years, seen in consultation with Dr. F. T. Fulton, March 2, 1914. Patient had developed tonsillitis two days previously, complaining of severe pain in the right ear for the past twenty-four hours. As the ear examination was entirely negative, the pain was ascribed to otalgia from the right tonsil, which was found to be inflamed and swollen. The following day the pain had increased in severity, examination revealing well marked mastoid tenderness on deep pressure, especially at the tip. The drum membrane, except for a slight blueness, appeared the same as on the day previous. Because of the pain and tenderness the drum was incised, and several drops of serum evacuated. The following day there was a copious otorrhea, the drum membrane was red and thickened, the clinical signs and symptoms of an acute and threatening mastoid infection being unmistakable. These symptoms persisted for several days and then gradually disappeared. Eighteen days after incision of the drum membrane the middle ear was dry and all clinical signs of mastoiditis had disappeared. Some impairment of hearing remained, patient complaining that the ear felt stuffy and the mastoid felt "stiff and lame." Although inflation through the eustachian catheter improved the hearing somewhat but did not relieve the subjective symptoms, X-ray examination was advised, not with the idea that anything pathologic would be found but that negative findings would have a beneficial mental effect.

A radiogram, taken by Dr. Percy Brown a month later, much to the writer's surprise, showed the right mastoid to be quite cloudy as contrasted with the left, this cloudiness being most marked in the tip and the posterior cells. On the strength of this finding a mastoid operation was advised but refused. A radiogram taken some months later showed apparent clearing up of the upper part of the mastoid, the posterior

portion and the tip remaining cloudy. A stereoradiogram taken recently by Dr. Gerber shows the upper portion of the mastoid to be pneumatic, while in the posterior portion and the tip the cells are almost entirely obliterated. An unusual density of the petrous bone is also shown (Figure 20 a, b). This does not seem to have any especial significance, for at present the hearing in the left ear is normal, while in the right ear the patient hears a whisper at three feet, the test otherwise being practically the same as in the right.

This case shows that subjective mastoid symptoms when accompanied by loss of hearing are significant and should not be treated lightly.

Case 11.—A double middle ear and mastoid infection, both mastoids having large cells widely distributed and a very thick dense cortex. Latent mastoiditis in the right, a slow development of signs and symptoms in the left.

Private patient, a young man, aged twenty-two years, seen in consultation with Dr. A. Corvese, December 21, 1916. Patient developed influenza eight days previously, that was followed four days later by pain in both ears and a slight bloody discharge that stopped within two days, the pain in the ears persisting and the temperature remaining between 101 and 102 degrees. Examination showed redness and thickening of both drums, incision allowing the escape of thick pus. There was no mastoid tenderness. Patient was next seen in the writer's office January 6, 1917. Otorrhea had continued, but temperature had remained normal after the drum incision. Patient had developed tenderness in both mastoids, but while that in the right promptly subsided, slight tenderness remained in the tip of the left. Patient also developed severe shooting pains in the left occipital bone which have persisted. A moderate mucopurulent discharge was found in both ears. On the right side, except for the persistent otorrhea, there were no signs of mastoid involvement, but on the left side there was slight drooping of the posterior superior canal wall, slight tenderness at the tip, and a spot of exquisite tenderness in the occipital bone at a point half way between the auricle and the occipital protuberance, which from its location was thought to have no relation to the mastoid. In-

fection of the left mastoid was considered probable, and a radiogram advised, which was not taken till January 23d.

The radiograms showed both mastoids to be very large with extensive posterior prolongations and a general destruction of cell structure, apparently as widespread in the one as the other. Patient did not consent to operation till a week later, when he was admitted to the Rhode Island Hospital. Since the examination three weeks before, the left mastoid, including the posterior superior canal wall, had become very edematous, the otorrhea being also increased. The discharge from the right ear had remained about the same, and no tenderness or any other sign of mastoid involvement had developed except a slight drooping of the posterior superior canal wall.

At operation the anatomic structure and the pathologic changes were practically the same in both mastoids. There was found externally an absence of tip development, and a warped appearance of the cortex similar to that found in the type 2 infantile mastoids (Cases 2, 3). Removal of an unusually thick and dense cortex revealed an almost complete destruction of cell structure and internal table. Posteriorly the cells were found grouped into nests, having thick dense partitions. These nests all opened into the body of the mastoid, but had no apparent communication with each other. An enormous nest of necrotic cell structure was found extending deeply into the occipital bone. On the left side this cell extension reached the point at which exquisite tenderness had been discovered three weeks previously. Both middle ears were dry on the third day and both mastoids were entirely healed within two weeks.

This case shows the value of X-ray examination in cases of continued otorrhea following middle ear infection.

Case 12.—A double middle ear and mastoid infection occurring in an eight-year-old child. Both mastoids of large size and having a cortex of unusual thickness and density.

Private patient, a girl, aged eight years, seen in consultation with Dr. J. W. Mitchell. Patient and a sister aged ten years had developed influenza the day previously, the older sister running a temperature from 102 to 104 degrees for nearly a week with no ear symptoms whatever.

Patient had complained of pain in the left ear for twelve

hours, examination showing a red and bulging drum, incision of which was followed by the escape of bloody serum. The right drum appeared normal, but was incised the following day because of beginning redness and bulging. The temperature ranged from 100 to 105 degrees for the next three days, but apart from a copious serous otorrhea, there were no signs of mastoid involvement. In consultation with Dr. E. A. Crockett it was decided that in the light of the temperature the sister was then running and the absence of signs in the mastoid, no apprehension need be felt.

The morning temperature became normal a week after the first visit and remained so for the next six days, the evening temperature staying at 99°. During this time the otorrhea lessened in amount, becoming seropurulent in character, but as a slight drooping of the right posterior superior canal wall had developed Dr. Crockett was again called in consultation, when it was decided that the patient was in no immediate need of operative interference. In addition to the low temperature, the decreasing otorrhea and absence of mastoid tenderness or edema, a bacteriologic examination of both ears had shown staphylococcus aureus in pure culture.

As stated before, for six days the temperature did not go above 99°; then for the next five days it steadily increased, mounting higher and higher day by day, the patient meanwhile showing signs of severe sepsis. During this time the drooping in the right canal disappeared and no other signs of mastoid involvement appeared in either mastoid. The otorrhea instead of increasing appeared to be slowly diminishing, so had it not been for the increasing temperature and accompanying sepsis, it would have been thought that the case was progressing favorably. On the fifth day after the commencement of septic symptoms Dr. Gerber, by means of a portable apparatus, took radiograms which when developed showed infection and breaking down of cell structure in both mastoids. Radiograms would have been taken sooner had it been thought possible to secure any definite information by means of a portable apparatus, for negative findings would only have increased the difficulties in this particular case.

The evening temperature this day reached 105°, but the following morning the temperature again dropped to normal,

and patient's condition appeared better than it had for several days. The parents naturally wished to postpone operation, but with the positive evidence of the radiograms at hand were readily convinced of its necessity. A double mastoid operation was performed this same morning, the writer being assisted by his former chief, Dr. Crockett, a courtesy greatly appreciated. Both mastoids were found to be practically alike in both structure and pathology, removal of an unusually thick dense cortex revealing large and extensive necrotic cells filled with pus and granulations. The left sinus was bare for about two-thirds of an inch. Cultures taken from both mastoids showed streptococcus in pure culture, presumably the mucosus capsulatus, although this point was not determined. Two previous examinations of the aural discharge had shown nothing but staphylococcus aureus. For four days following the operation patient appeared very septic, was delirious most of the time and ran a high pulse and temperature. When conditions seemed to be at their worst, the temperature suddenly dropped to normal and the patient made an uninterrupted canvalescence.

This case illustrates the difference between hospital and private practice, for the rising temperature and accompanying sepsis were of themselves sufficient to justify exploration of both mastoids, a procedure of easy accomplishment in hospital practice where securing permission to operate is the least of our worries. In this case the father later assured the writer that he would not have consented to the operation in the absence of positive evidence of mastoid involvement, such as we had in the radiograms—in other words, he would not have consented to an "exploratory" operation.

Case 13.—A double decked mastoid, in which the lower deck of cells was discovered at the second secondary operation.

This history is reported from the records of the Massachusetts Charitable Eye and Ear Infirmary, by courtesy of Drs. F. A. Washburn and G. L. Tobey, Jr., the patient having been last admitted during the interneship of the writer. The essentials of the hospital records are given, but are somewhat rearranged for the sake of continuity.

Outpatient Record No. 35685a.—Patient, a male child, aged

three years. September 10, 1903. Diagnosis: Secondary mastoiditis. Recommended for admission to house.

House Record.—Mastoid operation five months previously at the Carney Hospital.

September 19. Secondary mastoid operation, old cavity cleaned out, and opening into antrum enlarged, no sinus or dura exposed. Wound healed very slowly.

Outpatient Record (Continued).—November 23. Small amount of superficial granulations. December 12. Wound healed but tissues very soft. August 8, 1910. Old mastoid wound has broken down again; slight discharge; no bare bone. August 9. Recommended for admission to house.

House Record, Volume 30, Page 32.—August 12, 1910. Diagnosis: Unhealed mastoid cavity.

Since the previous operation, September 19, 1903, the mastoid cavity has frequently become moist; the last time about one week ago; no otorrhea.

Examination.—Large depressed cavity in left mastoid with large granulating moist area at bottom in region of antrum. Small sinus evidently leading to middle ear at floor of cavity.

August 17. Operation (Dr. G. L. Tobey, Jr.).—Old cavity was curetted out. A second deck of mastoid cells that had never been opened was found under the posterior canal wall and thoroughly curetted out. Sinus was exposed and found in normal position. Dura over tegmen was also exposed. Antrum was opened very widely. Skin dissected up posteriorly and trimmed. Wound sutured above and below, wick to antrum. The case made a slow but uneventful recovery, the operation cavity, showing but little tendency to granulate, healed by dermatization.

It would be interesting to know the character of the cell structure found at the first operation. The child was then three years old, an age in which well marked pneumatic structure is unusual, although Stewart[14] has demonstrated by X-ray examination an extensive pneumatic development at the age of two years. According to the writer's remembrance of the third operation, performed seven years after the second, the old operation cavity was large and extensive, suggesting the previous removal of considerable cell structure. The second deck of cells, separated from the cavity by a layer of dense

bone, extended deeply into the posterior part of the pyramid. A stereoradiogram of this mastoid would in all probability have disclosed the infected cells as in Case 7 (Figure 19).

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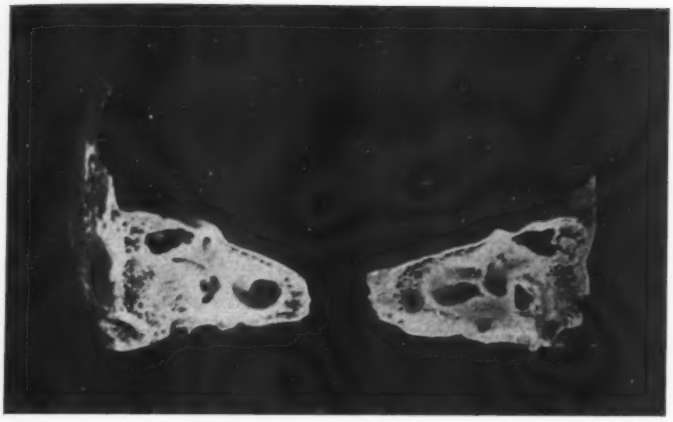

Fig. 1. Right bone of a male aged nine months, showing the diploetic type of "mastoid mass" in infancy.

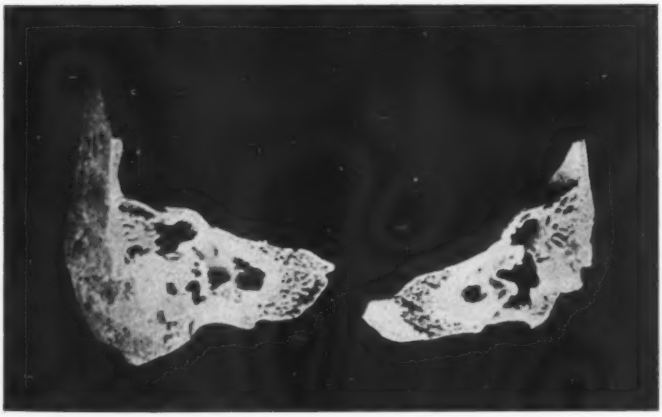

Fig. 2. Right bone of a male aged seven months, showing the dense type of "mastoid mass" in infancy.

(Figures 1, 2, 3, and 4 are reproductions of Cheatle's original illustrations (9)).

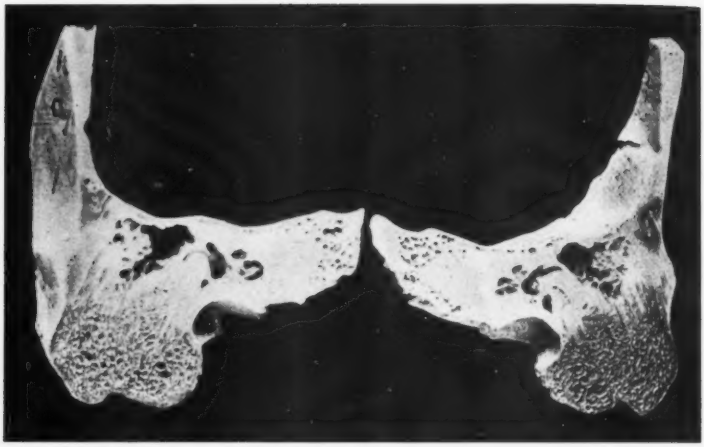

Fig. 3. Right bone of a male aged 42 years, showing the diploetic infantile type in the adult, type 1.

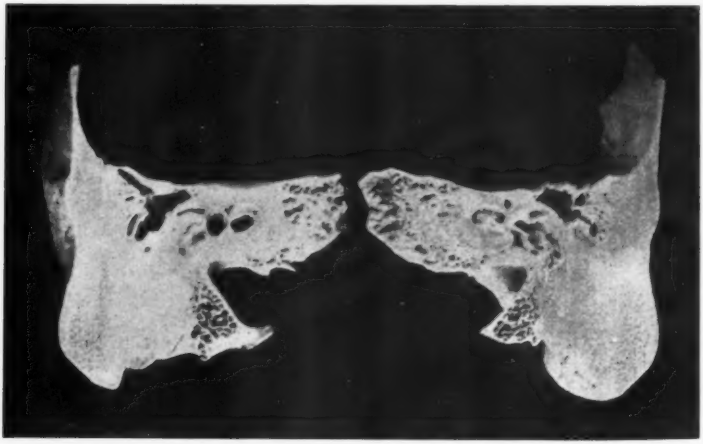

Fig. 4. Right adult bone, showing the dense infantile type in the adult, type 2.

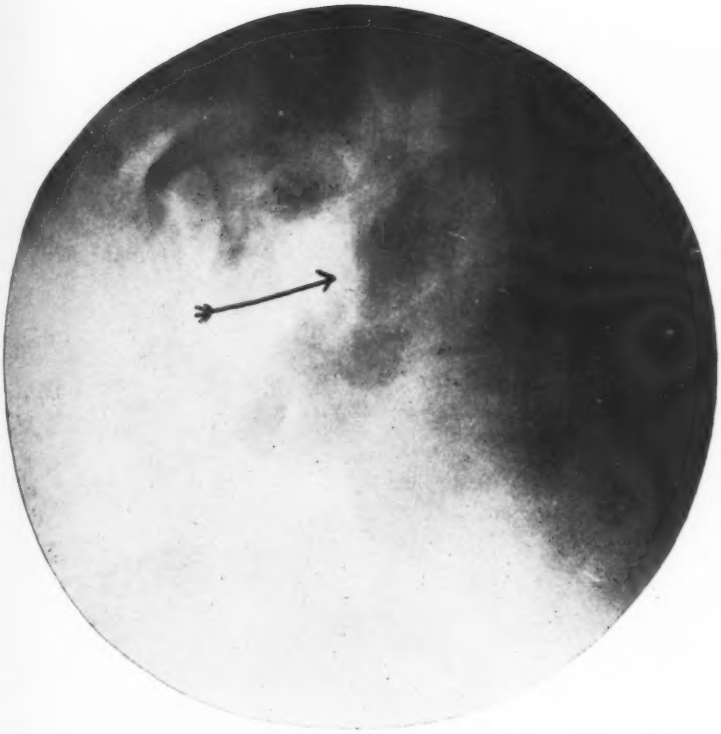

Fig. 5. A right infantile mastoid, probably type 2. Print from the pathologic stereoradiogram Case 1. A sinus found to be very superficial at operation.

Fig. 6. A right infantile mastoid, probably type 1. Print from the normal stereoradiogram Case 5. On the left side a type 1 infantile mastoid was found at operation.

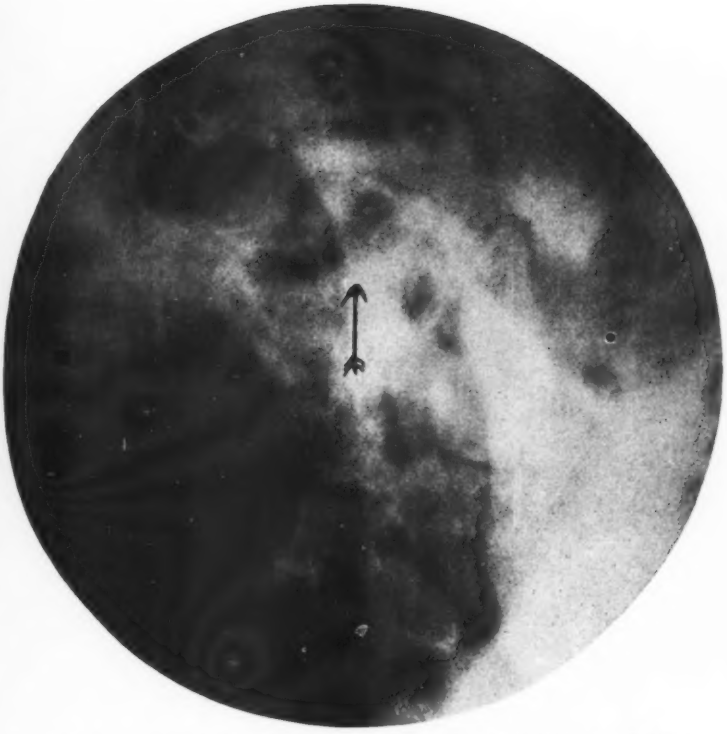

Fig. 7. A normal left infantile mastoid, probably type 2. Print from the radiogram Case 6, in which there was pain and mastoid tenderness without other evidence of middle ear or mastoid infection, probably hysterical.

Fig. 8. A right infantile mastoid in a man aged 67 years, probably type 3. Print from the normal radiogram Case 8. A few large cells are seen in the tip and along the squamomastoid suture, probably rudimentary pneumatic structure. Compare with Fig. 9.

Fig. 9. A right normal mastoid in a girl aged 8 years, showing a few large scattered cells, probably rudimentary pneumatic structure. Compare with Fig. 8.

Fig. 10a. The left normal pneumatic mastoid Case 3.

Fig. 10b. The right type 2 infantile mastoid. Print from the pathologic radiogram Case 3. This was interpreted before operation as a large broken down mastoid. Compare with Fig. 10a.

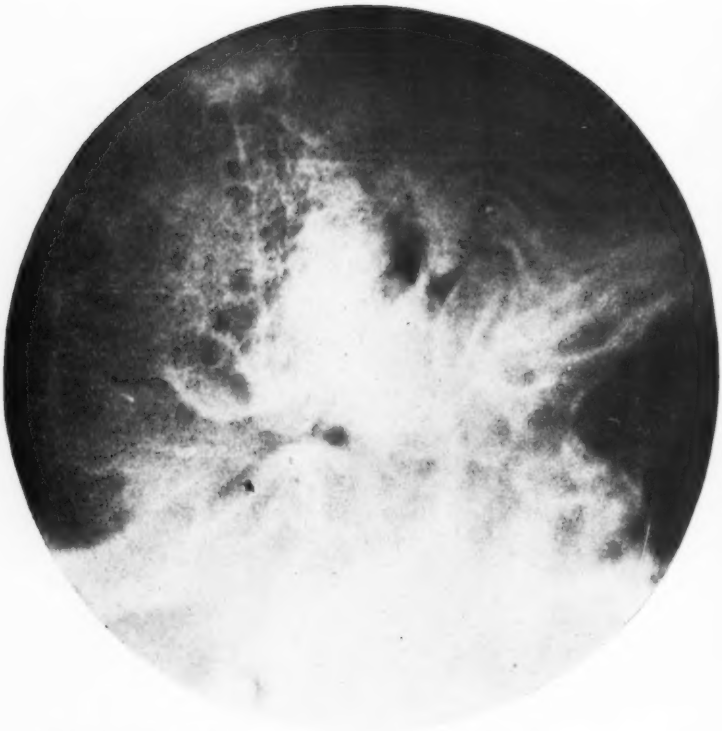

Fig. 11a. The right normal pneumatic mastoid Case 4.

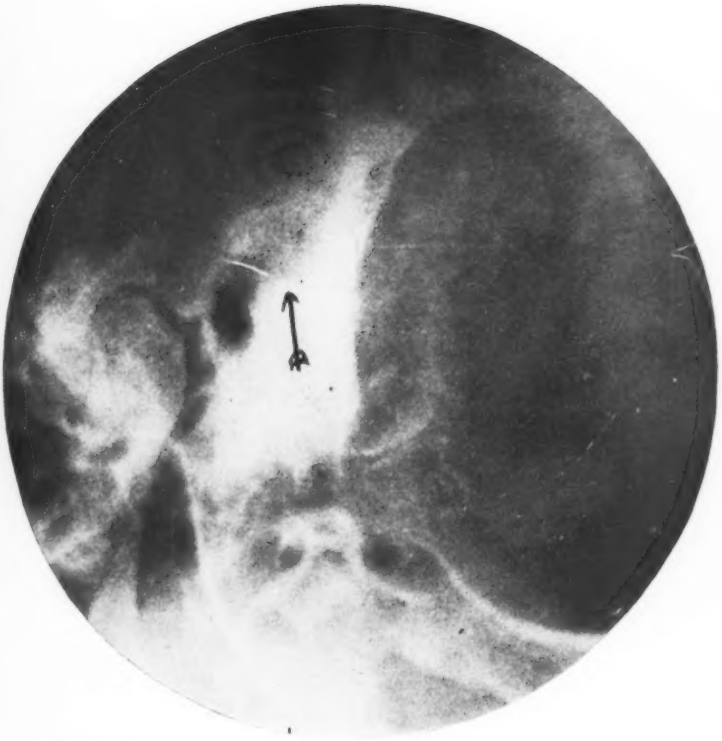

Fig. 11b. The left pathologic mastoid Case 4. At operation a chronically infected antrum was found deeply situated in dense bone.

Fig. 12. A left pneumatic mastoid, probably type 1. Note the relation of the middle ear, additus and antrum.

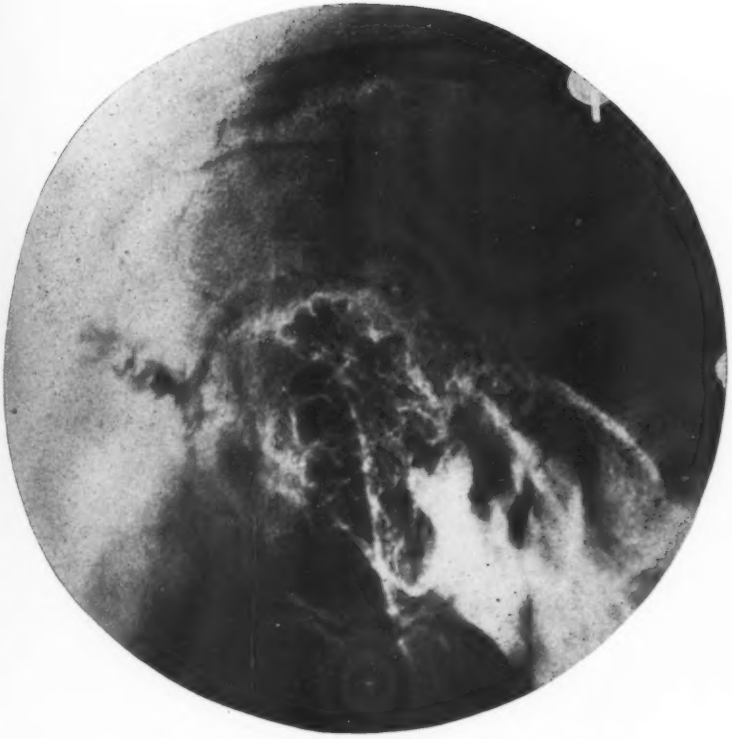

Fig. 13. Print from a stereoradiogram of a skull, showing zygomatic cells extending to the temporomandibular articulation.

Fig. 14a. The right normal mastoid Case 9, showing zygomatic cells nearly surrounding the temporomandibular articulation. Compare with Fig. 13.

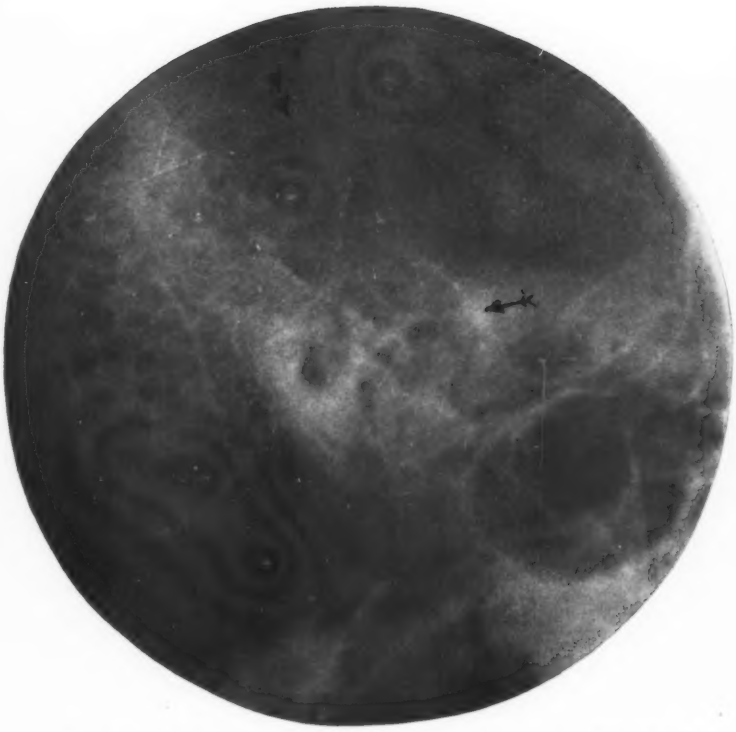

Fig. 14b. A left pneumatic mastoid, probably type 1. Print from the pathologic radiogram Case 9. Zygomatic cells are seen extending to the temporomandibular articulation. There is general haziness of cells and apparent destruction of cell walls in the upper two-thirds.

Fig. 15. Photograph of a bone showing a nest of large diploetic cells in the tip separated from the pneumatic structure by a layer of compact bone. Compare with Fig. 16.

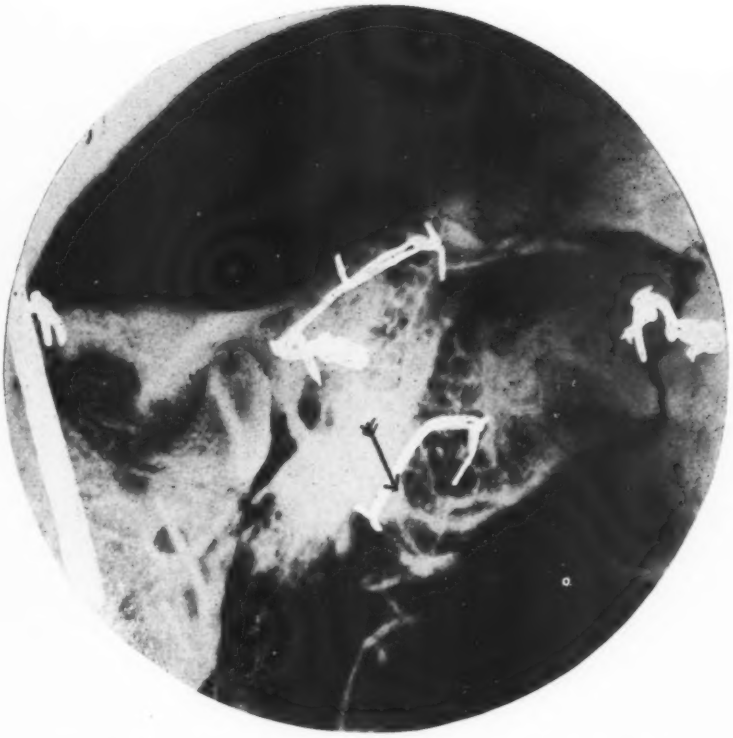

Fig. 16. Print from stereoradiogram of the bone shown in Fig. 15. Arrow points to nest of diploetic cells in the tip separated from the pneumatic structure by a layer of compact bone. This is even more evident when viewed stereoscopically.

Fig. 17a. Print from the stereoradiogram of a left normal pneumatic mastoid, probably type 1.

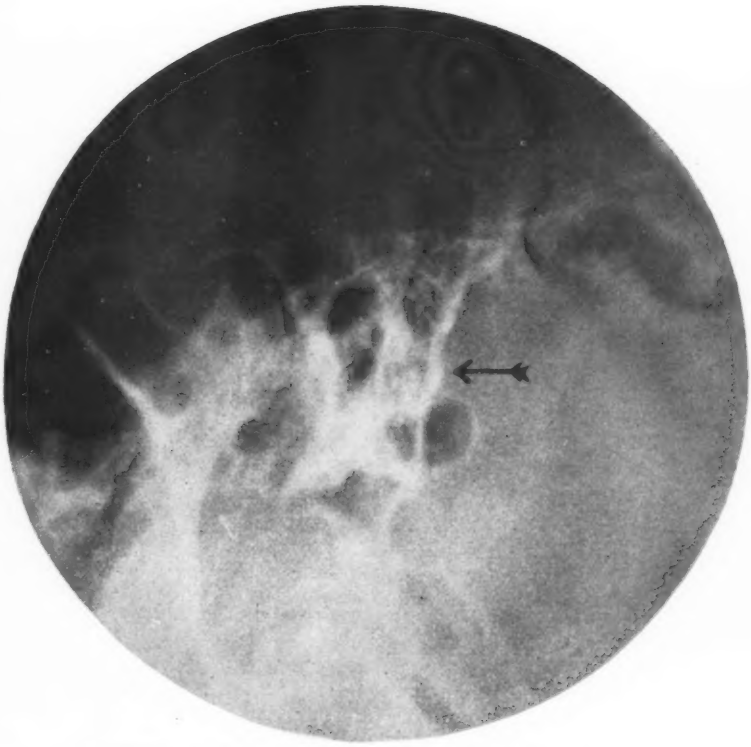

Fig. 17b. The right normal mastoid of same individual as Fig. 17a. Arrow points to apparent diploetic structure. Study of the stereoscopic plates shows that this is really many large pneumatic cells superimposed.

Fig. 18. A right mastoid, showing mixed diploetic and pneumatic cells. Stereoscopic study shows probable double decked arrangement, with diploetic cells underneath and pneumatic cells external.

Fig. 19. Operation cavity left mastoid. Print from stereoradiogram Case 7. Arrow points to infected residual cells in floor of cavity overlying sinus. This is shown very clearly when viewed stereoscopically.

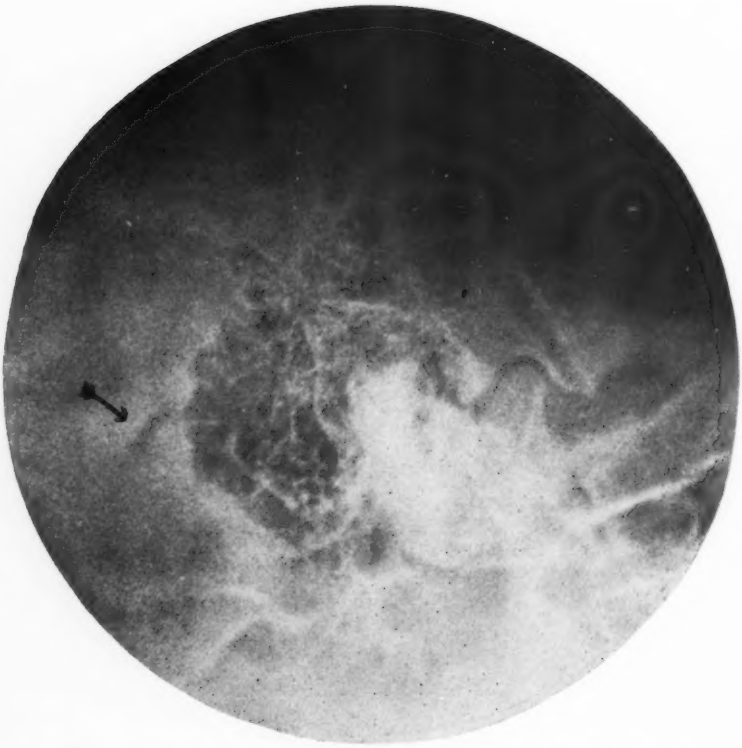

Fig. 20a. The normal left pneumatic mastoid, probably type 1, Case 10. Emissary vein shows very clearly.

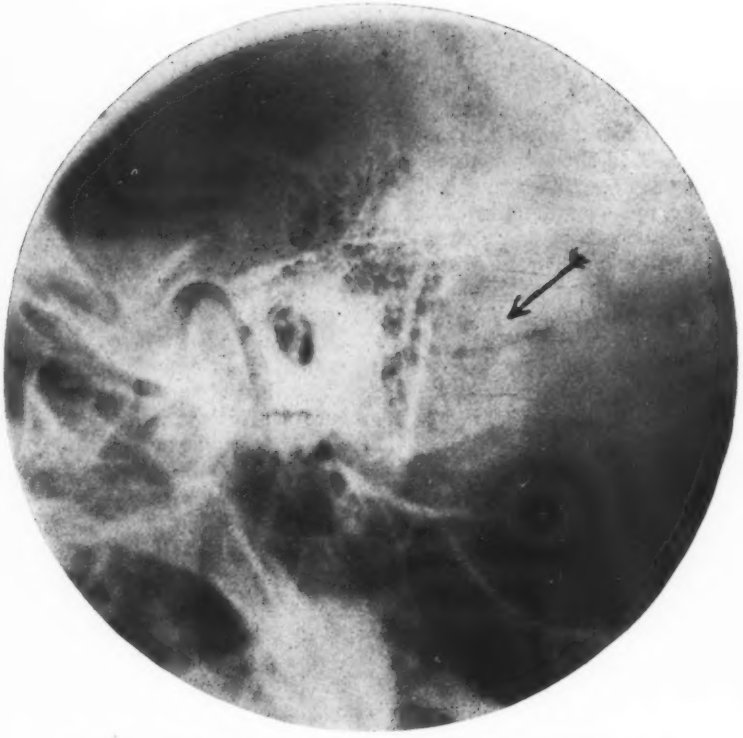

Fig. 20b. Print from stereoradiogram of right mastoid, Case 10. Posterior portion and tip show probable sclerosis with a few scattered hazy cell remnants. Compare with Fig. 20a.

LV.

ANATOMY OF THE NASAL ACCESSORY SINUSES IN INFANCY AND CHILDHOOD.*

By Warren B. Davis, M. D.,

Philadelphia.

Types of development and the extent of pneumatization found in the nasal accessory sinus areas during infancy and childhood show as marked variations at any given period of development as are found in individual adult cases. The average extent, however, of this pneumatization in infancy and the rate of its development during childhood have usually been underestimated—probably because the bodies of children are not often available for dissections—and opinions have thus been based in many instances on too few observations to make them of practical value.

In this series of dissections of one hundred and sixty lateral nasal walls, upon which the following observations are based, we have endeavored to secure a sufficient number to make the average development found in the different years of childhood of value both to the anatomist and to the clinician. We have considered embryologic and fetal development in detail elsewhere, thus all such observations will be omitted here. The ages of specimens and the number of lateral nasal walls dissected and studied were as follows:

Under 1 year	28	Ten years	4
One year	20	Eleven years	2
Two years	16	Twelve years	2
Three years	12	Thirteen years	6
Four years	16	Fourteen years	2
Five years	6	Fifteen years	6
Six years	16	Sixteen years	6
Seven years	10		
Eight years	10	Total	160
Nine years	4		

*Read before the section of Laryngology, Otology and Rhinology at the meeting of the American Medical Association, Chicago, June 14, 1918.

The ethmoidal, frontal, maxillary and sphenoidal areas will be considered separately. Pneumatization of the lateral ethmoidal mass proper is, in a majority of cases, complete at birth (Figure 1).* The cells subsequently increase in size, not only by expansion as the ethmoidal area grows, but also by invasion of the surrounding areas, so that the distal boundaries of the cells may soon extend into the frontal region (Figure 13), into the supraorbital plate of the frontal bone, into the infraorbital plate of the maxilla (Fig. 19), into the orbital process of the palate bone, into the agger nasi (Figure 10), or into the middle concha (Figure 24); the extent into any or all the different areas showing great variations.

The conchæ frontales (Figure 18) are relatively more prominent in early childhood than they are in adult life. Three conchæ frontales represent the complete formation, but two are more frequently found, while in a few cases only one, and in still others none is demonstrable (Figure 20). Cellulæ frontales thus vary from two to four in number, or in the absence of all frontal conchæ there is simply the smooth recessus conchalis. When cellulæ frontales are few in number or are absent, then the cellulæ infundibulares are apt to be more numerous and to occupy a larger area (Figure 13).

The sinus frontalis has its origin in all cases from the anterior ethmoidal area—the relative rate of advancement of the cells of the different groups determining which will eventually become the sinus. In very few cases can the route of development be demonstrated with absolute certainty before the sixth month of postnatal life (Figure 4), and in many instances it is near the end of the first year (Figure 5).

In 41 per cent of cases the development was by extension of one of the cellulæ frontales (Figures 5, 18, 21 and 22); in 18.4 per cent, by extension of the recessus conchalis—no cellulæ frontales being demonstrable (Figure 20); in 1 per cent, by extension of a cellula ethmoidalis anterior having its origin from the suprabullar furrow (Figure 16); in 24 per cent, by extension of one of the cellulæ infundibulares (Figure 7); and in 15.6 per cent, by a direct extension from the

*Illustrations are from "Development and Anatomy of the Nasal Accessory Sinuses in Man" (Davis), by Courtesy of the W. B. Saunders Co.

infundibulum ethmoidale (Figure 17). Approximately 4 per cent of cases show supernumerary sinus frontales, which may develop from two cellulæ frontales (Figure 18), from two cellulæ infundibulares, or from any combination of the above mentioned routes of development of the usual sinus frontales.

From whichever source a frontal sinus may have its origin, the process of pneumatization gradually extends from that portion of the anterior ethmoidal area toward and into the inferior portion of the frontal bone, advancing as the cancellous bone is absorbed. In an average case the sinus begins its ascent into the vertical portion of the frontal bone during the second year, and at three years is 3.8 millimeters above the level of the nasion, and continues its vertical advance at an average rate of approximately 1.5 millimeter per year until the fifteen year (Figure 21).

The sinus maxillaris at birth is an oblong ovoidal sinus (Figure 1), its diameters averaging 8.2 millimeters anteroposteriorly, 3.3 millimeters vertically and 2.8 millimeters laterally. As the body of the maxilla increases in its diameters there is an increase in the extent of pneumatization, averaging, until the ninth year, 2 millimeters each year in both the vertical and lateral diameters, and 3 millimeters anteroposteriorly. After the ninth year development advances more slowly in all diameters, reaching by the fifteenth year a form which approximates the usual adult type, later changes occurring chiefly in the posteroinferior angle which descends as the third molar tooth erupts. In its lateral development an average sinus maxillaris reaches the sagittal plane of the nervus infraorbitalis by the end of the first year, passes beneath the nerve during the second year, after which time the canal for the nerve is a ridge of varying prominence (Figures 8 and 9).

The average relation of the floor of the maxillary sinus to the nasal floor in the different years of childhood is of clinical importance in determining the point for making punctures of the medial wall for diagnostic or therapeutic measures. Under one year (Figure 3) the level of the average sinus floor is 4.2 millimeters superior to the floor of the nasal fossa. This average difference decreases (Figures 8, 9 and 19) approximately 0.5 millimeter each year, until the eighth or ninth year, when the floors are on the same level.

In the majority of older cases the maxillary sinus floor is from 1 millimeter to 7.5 millimeters below the level of the nasal floor (Figure 23).

The ostium maxillare accessorium (Figures 10, 13 and 16) has no embryologic significance in its development, but is purely the result of progressive thinning of the medial wall of the sinus at a point where there is no osseous lamina between the mucosa lining the sinus and that lining the meatus medius. The youngest specimen showing an accessory ostium was from a child four years, three months and two days old. In specimens over this age accessory ostia were present in 15 per cent of cases. In 76 per cent of cases showing accessory ostia, there were small mucous retention cysts in the mucosa lining the medial walls of the sinus maxillares (Figures 13 and 16).

The sinus sphenoidalis develops as an extension from the posterosuperior portion of the recessus sphenoethmoidalis. Under one year of age (Figure 2) the diameters of an average sinus sphenoidalis are 2.8 millimeters vertically, 2 millimeters laterally and 1.5 millimeters anteroposteriorly. Its advancement is at first most marked in a posteroinferior and slightly lateral direction. Its anteroinferior wall is formed by that portion of the posterior nasal capsule in which the concha sphenoidalis, or ossiculum Bertini, has developed and shows well advanced ossification at birth (Figure 2). During the second or third year this bone becomes firmly attached to the body of the sphenoid.

The sinus sphenoidalis develops more rapidly posterolaterally than it does directly posteriorly (Figure 6). The lateral wall of the average sinus soon becomes quite thin—one millimeter or less in its thinnest portion by the end of the second or during the third year, thus bringing the sinus into close relation to the cranial nerves passing just lateral to the body of the sphenoid (Figure 15). The floor of the sinus sphenoidalis is in many instances in close relation to the Vidian nerve by the end of the sixth year.

The septum sphenoidale is relatively quite thick in infancy, averaging 7 millimeters. The medial advancement of resorption is such that the septum reaches a thinness of 1 millimeter or less by the ninth or tenth year.

In average cases the rate of resorption of the body of the sphenoid is such that by the eighth to the tenth year the posterosuperior portion of the sinus lies beneath the anterior portion of the sella turcica, and by the fifteenth year is usually separated from the hypophysis by a very thin lamina of compact bone (Figures 10, 11, 12, 14, 18, 20, 22, 23 and 24).

In many instances pneumatization extends by the fourteenth year well into the processus pterygoideous, in which cases a distinct ridge (Figure 23) marks the nervus canalis pterygoidei (Vidii).

We hope that the above described types and extents of pneumatization will furnish a working anatomic basis for the consideration of the symptoms and the treatment of pathologic conditions occurring in the accessory sinuses during the different years of childhood.

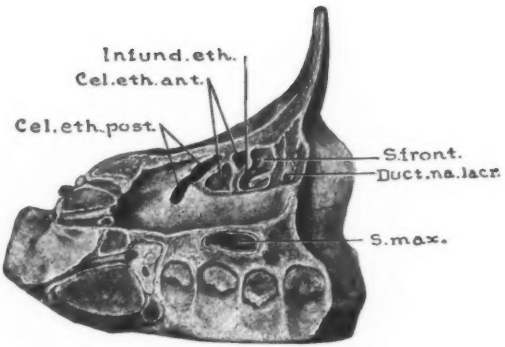

Fig. 1.—Specimen From a Child Eight Days Old. (Series D, No. 1.)*

By sagittal sections removing the lateral portion of frontal bone, lamina papyracea of ethmoid, and lateral portion of maxilla—the sinus maxillaris, cellulæ ethmoidales, anterior and posterior, infundibulum ethmoidale, and the primitive sinus frontalis are brought into view. S.front., Primitive sinus frontalis; Duct.na.lacr., ductus nasolacrimalis; S.max., sinus maxillaris; Cel.eth.post., cellulæ ethmoidales posterior; Cel.eth.ant., cellulæ ethmoidales anterior; Infund.eth., infundibulum ethmoidale.

*Illustrations are reproduced through the courtesy of the W. B. Saunders Company.

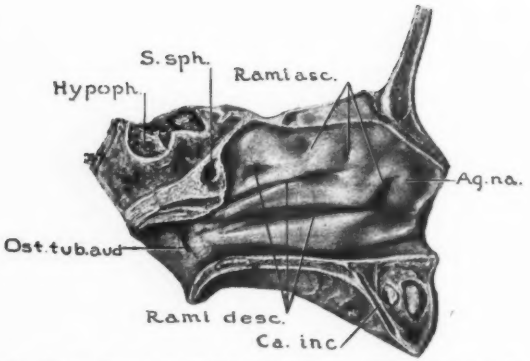

Fig 2.—Specimen From a Child Eight Days Old. (Series D, No. 1.)

Sagittal section in median line through frontal and maxillary bones and 3 mm. to left of median line through sphenoid bone. Shows the left lateral nasal wall, the ascending and the descending rami of the meatuses, also the extent of development of the sinus sphenoidalis. Note that the anteroinferior wall of the sinus sphenoidalis (concha sphenoidalis or ossiculum Bertini) is well ossified. Ag.na., Agger nasi; Ca.inc., canalis incisivus; Rami desc., rami descendens of ethmoidal meatuses; Ost.tub. aud., ostium tubæ auditivæ; Hypoph., hypophysis; S.sph., sinus sphenoidalis; Rami asc., rami ascendens of ethmoidal meatuses.

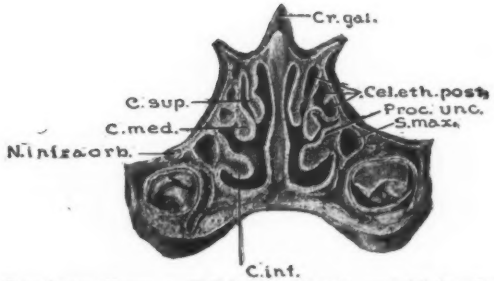

Fig. 3.—Specimen From a Child One Month and Eight Days Old. (Series D, No. 2.)

Posterior view of coronal section cut 16 mm. posterior to the nasion, showing the extent of superoinferior and lateral development of sinus maxillaris and cellulæ ethmoidales posterior. Note the proximity of developing teeth to the orbital floor. Cr.gal., Crista galli; Cel.eth.post., cellulæ ethmoidales posterior; Proc.unc., posterior extremity of processus uncinatus; S.max., sinus maxillaris; C.inf., concha inferior; N.infraorb., nervus infraorbitalis; C.med., concha media; C.sup., concha superior.

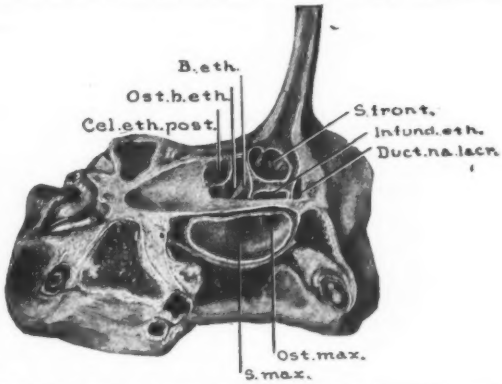

Fig. 4.—Specimen From a Child Four Months and Twenty-seven Days Old. (Series D, No. 5.)

Lateral portions of frontal, ethmoidal, and maxillary areas have been removed to show the extent of pneumatization. S.front., sinus frontalis developing from a furrow in the recessus conchalis; Infund.eth., infundibulum ethmoidale; Duct.na.lacr., ductus nasolacrimalis; Ost.max., ostium maxillare; S.max., sinus maxillaris; Cel.eth.post., cellula ethmoidalis posterior; Ost.b.eth., ostium bullæ ethmoidalis, opening into the suprabullar furrow; B.eth., bulla ethmoidalis.

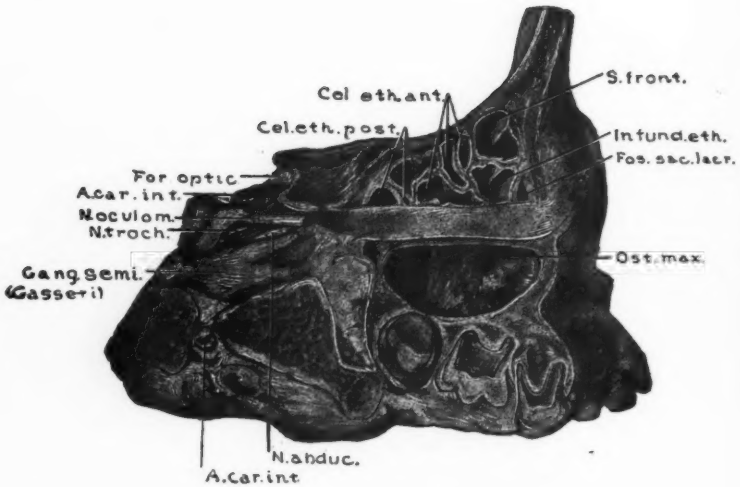

Fig. 5.—Specimen From a Child One Year, Four Months and Seven Days Old. Lateral View of Frontal, Ethmoidal and Maxillary Sinus Areas. (Series D, No. 14.)

S.front., Sinus frontalis developing from a frontal cell; **Infund.eth.**, **infundibulum** ethmoidale; **Fos.sac.lacr.**, fossa sacci lacrimalis; **Ost.max.**, **ostium** maxillare; **N.abduc.**, nervus abducens; **A.car.int.**, arteria carotis **interna**; **Gang.semi.**, ganglion semilunare (Gasseri); **N.troch.**, nervus **trochlearis**; **N.oculom.**, nervus oculomotorius; **For.optic.**, foramen **opticum**; **Cel.eth.post.**, cellulæ ethmoidales posterior; **Cel.eth.ant.**, cellulæ **ethmoidales** anterior.

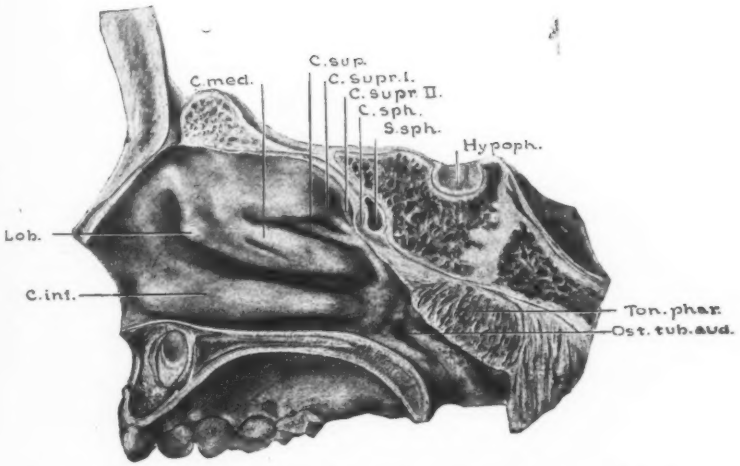

Fig. 6.—Specimen From a Child One Year, Ten Months, and Thirteen Days Old. Sagittal Section Showing Lateral Wall of the Nasal Cavity and the Sinus Sphenoidalis. (Series D, No. 20.)

Note the overlapping of the concha superior by the anterior portion of the concha suprema I; also note the accessory furrow on the medial surface of the concha media. In a plane more lateral than that shown in the illustration, the sinus sphenoidalis is more extensively developed in the posterolateral direction, its inferolateral wall being only 1 mm. from the fossa pterygopalatina and 2 mm. from the foramen rotundum. C.med., Concha media; C.sup., concha superior; C.supr. I, concha suprema I; C. supr. II, concha suprema II; C.sph., concha sphenoidalis (ossiculum Bertini); S.sph., sinus phenoidalis; Hypoph., hypophysis; Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; C.inf., concha inferior; Lob., lobulus.

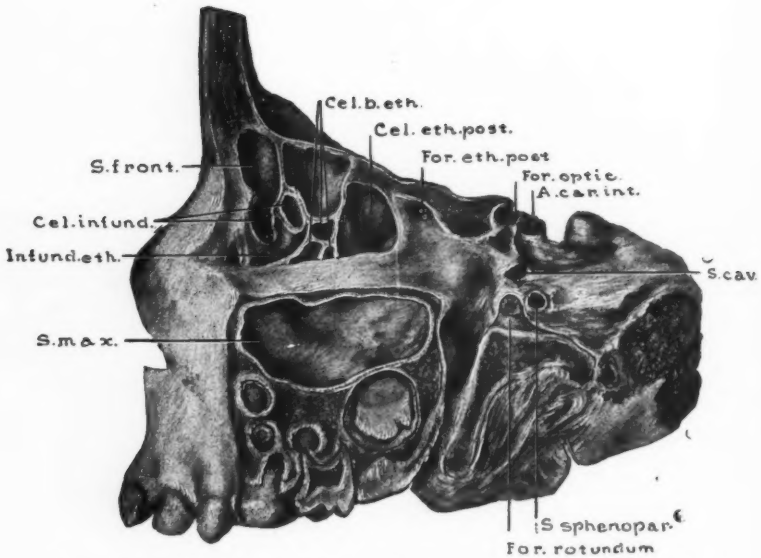

Fig. 7.—Specimen from a Child Two Years, Six Months and Twelve Days Old. (Series D, No. 25.)

Lateral view of left frontal, ethmoidal and maxillary sinus areas. Note advance of sinus frontalis into the vertical portion of the frontal bone. Cel.b.eth., Cellulæ bullæ ethmoidales; Cel.eth.post., cellula ethmoidalis posterior; For.eth.post., foramen ethmoidale posterius; For.optic., foramen opticum; A.car.int., arteria carotis interna; S.cav., sinus cavernosus; S.sphenopar., sinus sphenoparietalis; For.rotundum, foramen rotundum; S.max., sinus maxillaris; Infund.eth., infundibulum ethmoidale; Cel.infund., cellulæ infundibulares; S.front., sinus frontalis.

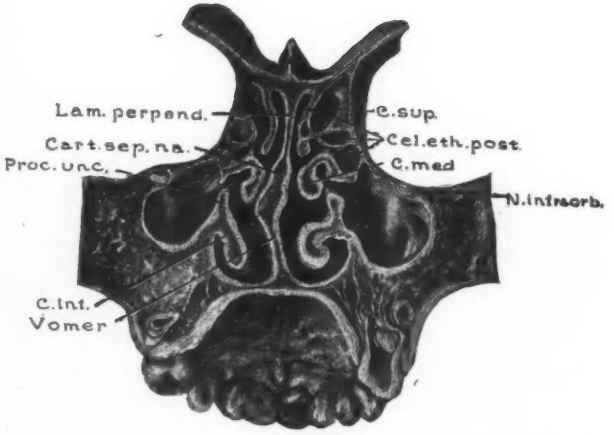

Fig. 8.—Specimen From a Child, Three Years, Five Months and Eight Days Old. (Series D, No. 32.)

Posterior view of coronal section cut 28.5 mm. posterior to nasion, showing the extent of lateral and superoinferior development of sinus maxillaris, the osseus ridge beneath nervus infraorbitalis, cellulæ ethmoidales posterior, and small conchal cells developing in each concha nasalis superior. The ostia maxillaria are larger than usual in the anteroposterior diameter. Note deflection of septum nasi and its influence on each concha media. C.sup., Concha superior; Cel.eth.post., cellulæ ethmoidales posterior; C.med., concha media; N.infraorb., nervus infraorbitalis; C.inf., concha inferior; Proc.unc., processus uncinatus; Cart.sep.na., cartilage septi nasi; Lam.perpend., lamina perpendicularis.

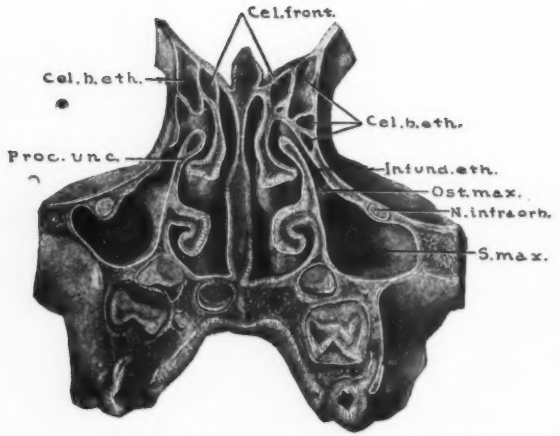

Fig. 9.—Specimen From a Child Four Years, Seven Months and Nineteen Days Old. (Series D, No. 40.)

Antérior view of coronal section, cut 16 mm. posterior to the nasion, showing the lateral and superoinferior extent of the maxillary sinuses, their relations to developing teeth, and the relations of the ostium maxillare to the infundibulum ethmoidale. Note ridge beneath the right nervus infraorbitalis. The bullar cells have their ostia in the suprabullar furrow. The ostia of the cellulæ frontales are medial to the processus uncinatus and the bulla ethmoidalis. Cel.front., Cellulæ frontales; Cel.b.eth., cellulæ bullæ ethmoidales; Infund.eth., infundibulum ethmoidale; Ost. max., ostium maxillare; N.infraorb., nervus infraorbitalis; S.max., sinus maxillaris; Proc.unc., processus uncinatus.

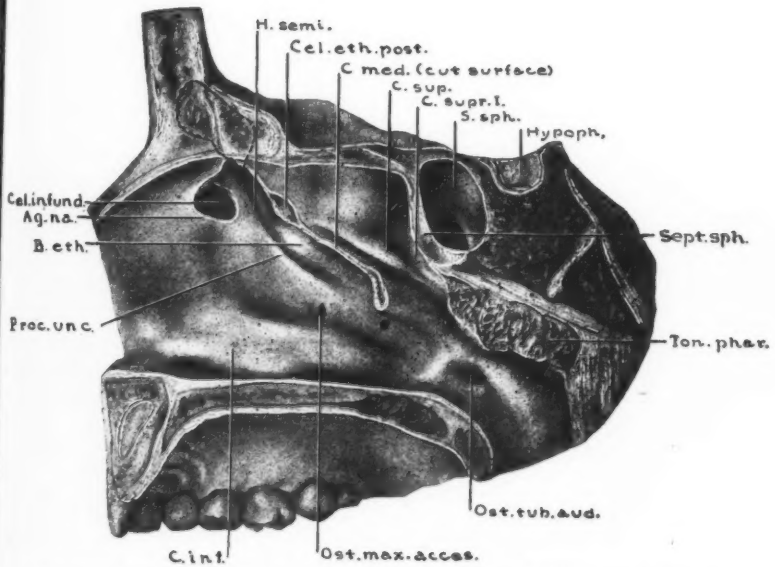

Fig. 10.—Specimen From a Child Five Years, Ten Months and Twenty-two Days Old. (Series D, No. 45.)

Sagittal section, ¾ mm. to the right of median line anteriorly; section through body of the sphenoid 2 mm. to the right of median line. Anterior portion of concha media has been removed to show the lateral nasal wall. Medial wall of an infundibular cell was removed with the anterior attachment of the concha media. Ostium frontale in this case communicates both with infundibulum and with the recessus conchalis medial to the processus uncinatus. Dotted line indicates outline of sinus frontalis. H.semi., Hiatus semilunaris; Cel.eth.post., cellula ethmoidalis posterior, extending into concha media; C.med., concha media (cut surface); C.sup., concha superior; C.supr.I, concha suprema I; S.sph., sinus sphenoidalis; Hypoph., hypophysis; Sept.sph., septum sphenoidale (anterior portion); Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; Ost.max.acces., ostium maxillare accessorium; C.inf., concha inferior; Proc.unc., processus uncinatus; B.eth., bulla ethmoidalis; Ag.na., agger nasi; Cel.infund., cellula infundibularis.

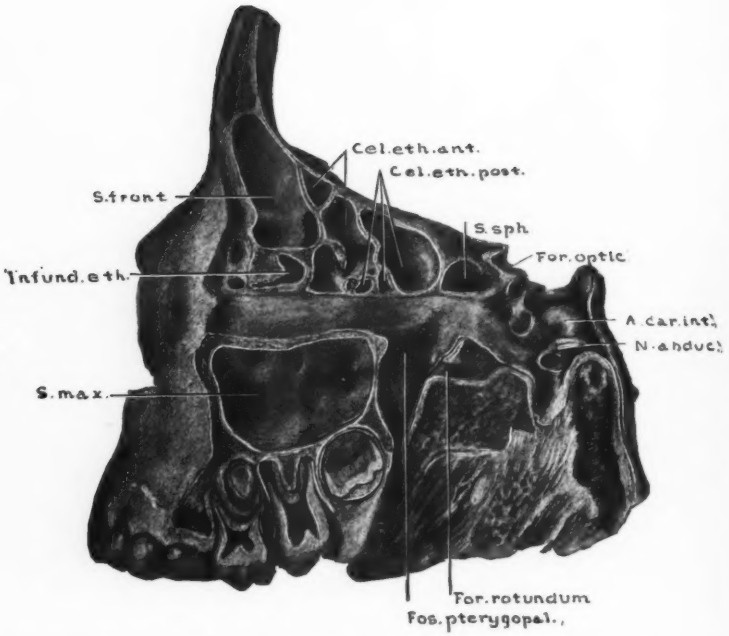

Fig. 11.—Specimen From a Child Five Years, Ten Months and Twenty-two Days Old. Lateral View of Frontal, Ethmoidal, Sphenoidal, and Maxillary Areas to Show the Extent of Pneumatization Present and the Relations of the Sinuses. (Series D, No. 45.)

Osseous wall, between sinus sphenoidalis and fossa pterygopalatina, is ½ mm. thick, while from sinus cavity to foramen rotundum is 1 mm. Sinus frontalis developed from an infundibular cell. Cel.eth.ant., Cellulæ ethmoidales anterior; Cel.eth.post., cellulæ ethmoidales posterior; S.sph., sinus sphenoidalis; For.optic., foramen opticum; A.car.int., arteria carotis interna; N.abduc., nervus abducens; For.rotundum, foramen rotundum; Fos.pterygopal., fossa pterygopalatina; S.max., sinus maxillaris; Infund.eth., infundibulum ethmoidale; S.front., sinus frontalis.

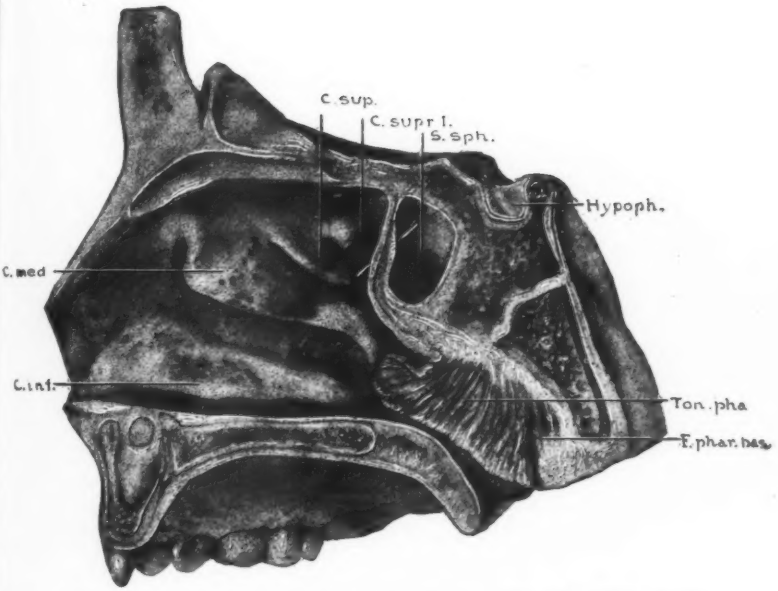

Fig. 12.—Specimen From a Child Six Years Old. Sagittal Section Showing Extent of Sphenoidal Pneumatization. (Series D, No. 46.)

The child from whom this specimen was taken died of nasal diphtheria. Note areas of submucous hemorrhages. The nasal cavities were completely filled with pseudomembrane, as were also the frontal sinuses and ethmoidal cells, while the maxillary and sphenoidal sinuses were approximately half filled. Also note the enormous tonsilla pharyngea, which nearly fills the posterior naris. (C.sup., Concha superior; C.supr.I, concha suprema I; S.sph., sinus sphenoidalis; Hypoph., hypophysis; Ton.phar., tonsilla pharyngea; F.phar.bas., fascia pharyngobasilaris; C.inf., concha inferior; C.med., concha media.

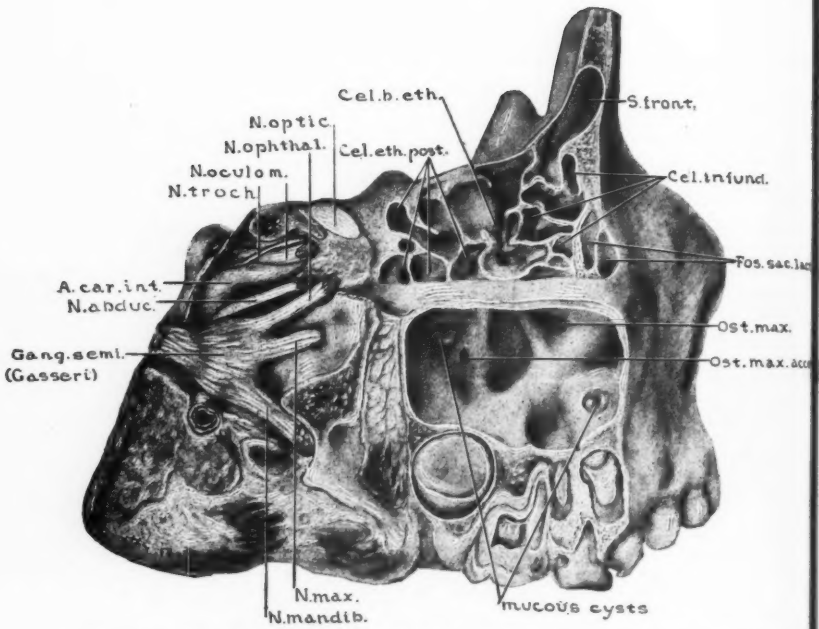

Fig. 13.—Specimen From a Child Six Years, Ten Months and Twenty Days Old. By Sagittal Sections the Lateral Portions of the Frontal, Ethmoidal, and Maxillary Areas Have Been Removed. (Series D, No. 53.)

The osseous ridges on the media wall of the sinus maxillaris are unusually prominent. The largest one overlies the ductus nasolacrimalis. There were two lacrimal sacs present, the superior portion of the duct being bifid. Note presence of ostium maxillare accessorium and the proximity of the mucous cyst. S.front., Sinus frontalis; Cel.infund., cellulæ infundibulares; Fos.sac.lacr., fossæ sacca lacrimales; Ost.max., ostium maxillary; Ost.max.acces., ostium maxillare accessorium; N.max., nervus maxillaris; N.mandib., nervus mandibularis; Gang.semi., ganglion semilunare (Gasseri); N.abduc., nervus abducens; A.car.int., arteria carotis interna; N.troch., nervus trochlearis; N.oculom., nervus oculomotorius; N.ophthal., nervus ophthalmicus; N.optic., nervus opticus; Cel. eth.post., cellulæ ethmoidales posterior; Cel.b.eth., cellula bullæ ethmoidalis.

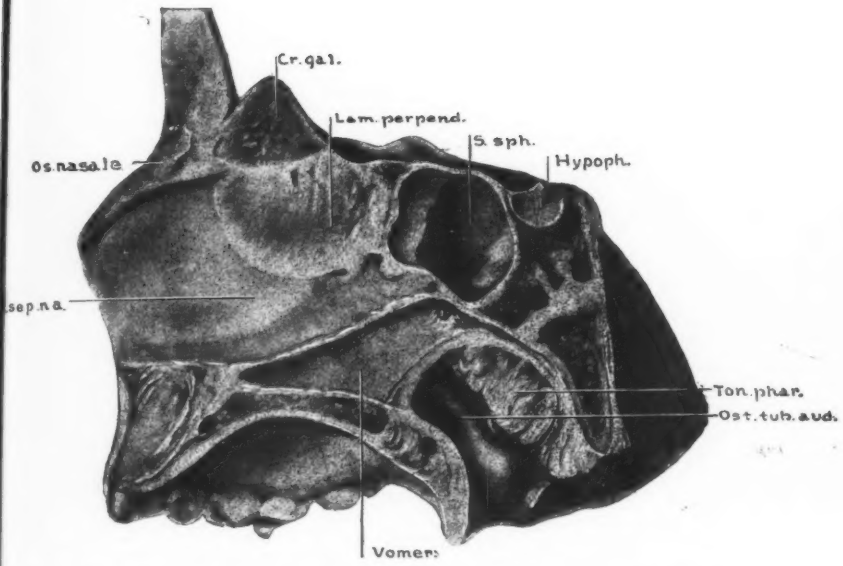

Fig. 14.—Specimen From a Child Six Years, Ten Months and Twenty Days Old. Lateral View of This Specimen Is Shown in Fig. 30. (Series D, No. 53.)

Sagittal section ½ mm. to the left of median line, showing extent of sinus sphenoidalis and also the relation of the structures entering into the formation of the septum nasi. Cr.gal., Crista galli; Lam.perpend., lamina perpendicularis; S.sph., sinus sphenoidalis; Hypoph., hypophysis; Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; Cart.sept.na., cartilago septi nasi.

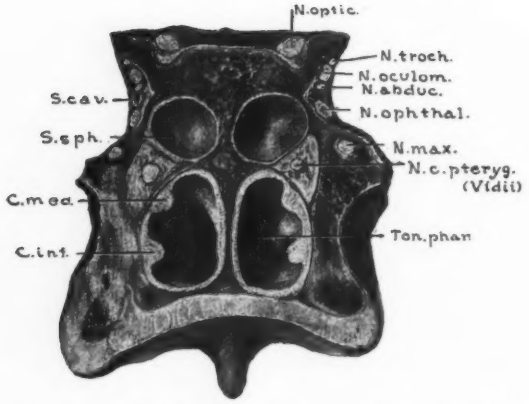

Fig. 15.—Specimen From a Child Seven Years, Nine Months and Twelve Days Old. (Series D, No. 58.)

Coronal section through the anterior portion of the body of the sphenoid bone, to show the relations of the cranial nerves to the sphenoidal area. The sphenoidal sinuses in this specimen show less extensive pneumatization of the body of the sphenoid than is usually seen at this age. N.optic., Nervus opticus; N.troch., nervus trochlearis; N.oculom., nervus oculomotorius; N.abduc., nervus abducens; N.ophthal., nervus ophthalmicus; N.max., nervus maxillaris; N.c.pteryg., nervus canalis pteygoidei (Vidii); Ton.phar., tonsilla pharyngea; C.inf., concha inferior; C.med., concha media; S.sph., sinus sphenoidalis; S.cav., sinus cavernosus.

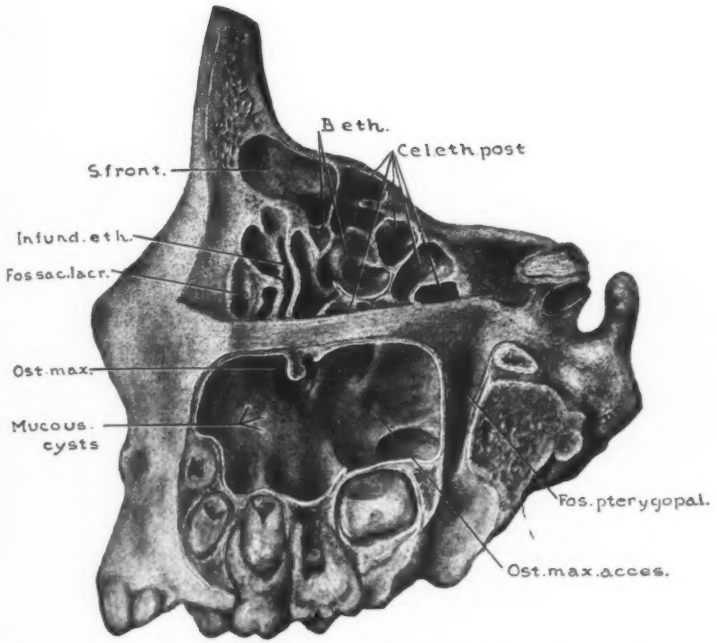

Fig. 16.—Specimen From a Child Eight Years, Two Months and Ten Days Old. (Series D, No. 59.)

Lateral view of frontal, ethmoidal and maxillary areas. Note that the sinus frontalis developed from a cell having its origin from the suprabullar furrow. The right sinus frontalis had a similar origin, these two being the only such instances found in the entire series. The superoinferior extent of the cellulæ ethmoidales is in this case greater than usually found at this age. B.eth., Cellulæ bullæ ethmoidales; Cel.eth.post., cellulæ ethmoidales posterior; Fos.pterygopal., fossa pterygopalatina; Ost.max.acces., ostium maxillare accessorium; Ost.max., ostium maxillare; Fos.sac.lacr., fossa sacci lacrimalis; Infund.eth., infundibulum ethmoidale; S.front., sinus frontalis.

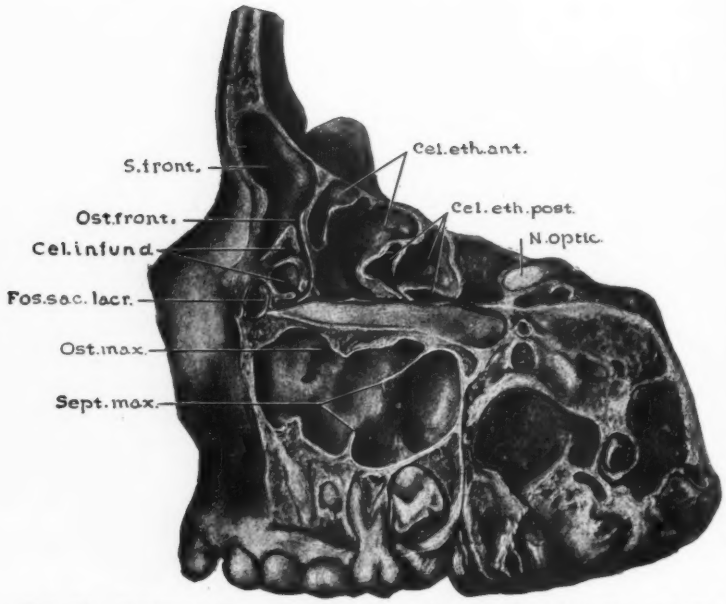

Fig. 17.—Specimen From a Child Eight Years, Eight Months and One Day Old. (Series D, No. 63.)

Lateral view of frontal, ethmoidal and maxillary sinus areas, the lateral portion of each having been removed by sagittal cuts. Note that the sinus frontalis developed directly from the infundibulum ethmoidale. Note also the incomplete septa in the sinus maxillaris. Cel.eth.ant., Cellulæ ethmoidales anterior; Cel.eth.post., cellulæ ethmoidales posterior; N.optic., nervus opticus; Sept.max., septulæ maxillares; Ost.max., ostium maxillare; Fos.sac.lacr., Fossa sacci lacrimalis; Cel.infund., cellulæ infundibulares; Ost.front., ostium frontale; S.front., sinus frontalis.

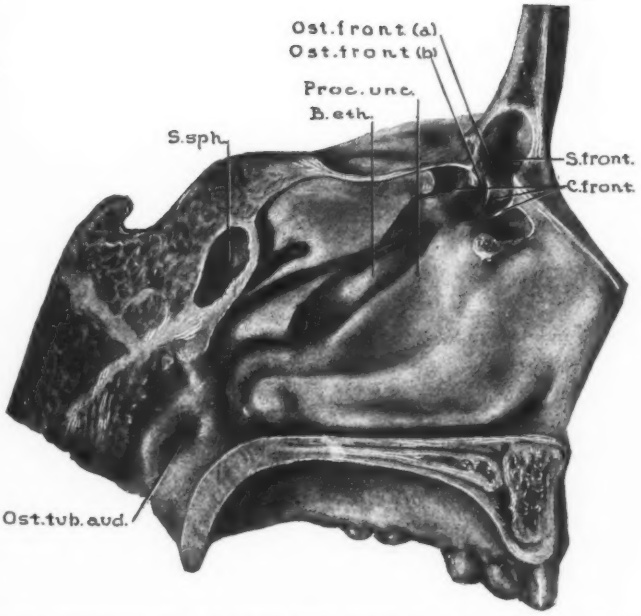

Fig. 18.—Specimen From a Child Nine Years, One Month and Nine Days Old. (Series D, No. 64.)

Incision through maxilla is ½ mm. to the right of median line; in the frontal region 1 mm. to the left, and through the body of the sphenoid is 5 mm. to the left of median line. The anterior portion of the concha media and a small portion of the frontal bone have been removed to show the structures entering into the formation of the lateral nasal wall, and also the location of the ostia frontalia. In this case there are three sinus frontales—one in the right side and the two in the left side here illustrated. Of the more lateral sinus frontalis, only the ostium is shown (Ost. front. (b)); the sinus, however, extends to the same height as the medial one shown in the illustration. Note that neither ostium comes into direct relation to the infundibulum ethmoidale. In the suprabullar furrow ostia of bullar cells are shown. S.front., Sinus frontalis; C.front., conchæ frontales; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; S.sph., sinus sphenoidalis; B.eth., bulla ethmoidalis; Proc.unc., processus uncinatus; Ost.front. (b), ostium of the lateral sinus frontalis; Ost.front. (a), ostium of the medial sinus frontalis.

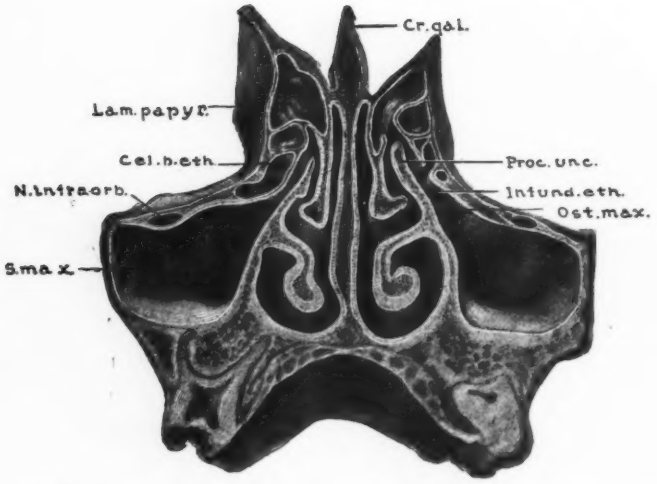

Fig. 19.—Specimen From a Child Nine Years, Ten Months and Nineteen Days Old. (Series D, No. 65.)

Anterior view of coronal section, cut 20 mm. posterior to the nasion, showing the size and relations of the sinus maxillaris, the ostium maxillare, and its manner of communication with the infundibulum ethmoidale ,the bulla ethmoidalis, processus uncinatus, and cellulæ ethmoidales anterior. Cr.gal., Crista galli; Proc.unc., processus uncinatus; Infund. eth., infundibulum ethmoidale; Ost.max., ostium maxillare; S.max., sinus maxillaris; N.infraorb., nervus infraorbitalis; Cel.b.eth., cellula bulla ethmoidalis; Lam.papyr., lamina papyracea. a

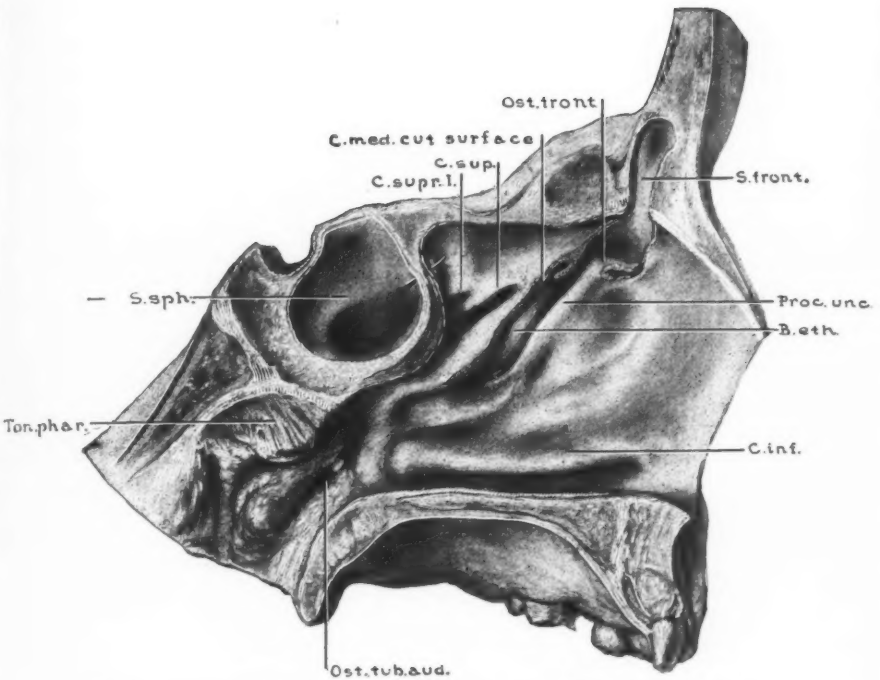

Fig. 20.—Specimen From a Child Ten Years, One Month and Seven Days Old. (Series D, No. 66.)

Sagittal section 1 mm. to the left of the median line. The anterior portion of the concha media and a portion of the medial wall of the sinus frontalis have been removed. Note that sphenoidal pneumatization has extended beneath the anterior portion of the sella turcica. S.front., Sinus frontalis; Proc.unc., processus uncinatus; B.eth., bulla ethmoidalis; C. inf., concha inferior; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; Ton.phar., tonsilla pharyngea; S.sph., sinus sphenoidalis; C.supr.I, concha suprema I; C.sup., concha superior; C.med., concha media; Ost. front., ostium frontale.

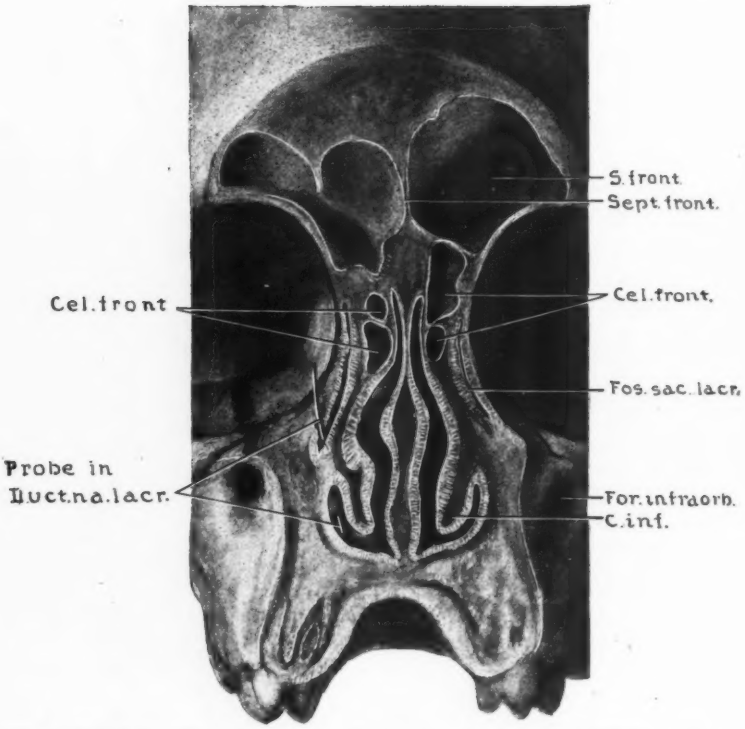

Fig. 21.—Specimen From a Child Twelve Years, Nine Months and Twelve Days Old. (Series D, No. 69.)

Anterior view of a coronal section cut 12 mm. posterior to the nasion, to show superior and lateral extent of the sinus frontales, also the relations of the cellulæ frontales. The frontal sinuses and all cells shown in this illustration have their ostia medial to the uncinate processes. Note the relations of the ductus nasolacrimalis. S.front., Sinus frontalis; Sept.front., septum frontale; Cel.front., cellulæ frontales; Fos.sac.lacr., fossa sacci lacrimalis; For.infraorb., foramen infraorbitalis; Duct.na. lacr., ductus nasolacrimalis.

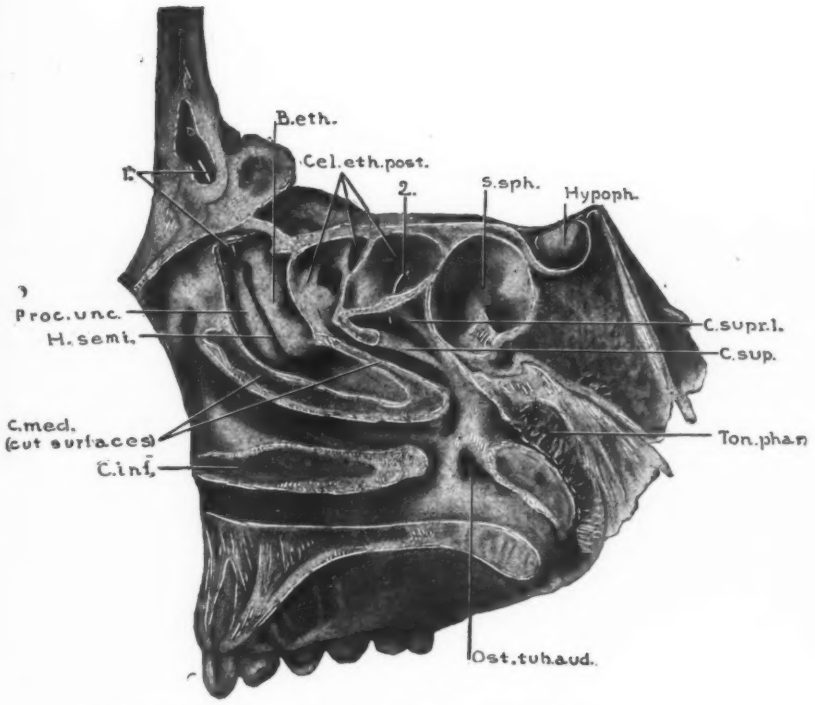

Fig. 22.—Specimen Fourteen Years and Seven Months Old.
(Series D, No. 73.)

Sagittal section, cut 4 mm. to the right of the median line, thus removing the medial portions of the concha inferior and concha media, and the medial anterosuperior portions of the concha superior and concha suprema I. The relations of the structures forming the lateral nasal wall and the positions of the ostia of the cellulæ ethmoidales are thus clearly shown. 1, Probe through ostium frontale; B.eth., bulla ethmoidalis; Cel.eth.post., cellulæ ethmoidales posterior; 2, probe through ostium of most posterior ethmoidal cell; S.sph., sinus sphenoidalis; Hypoph., hypophysis; C.supr.I, concha suprema I; C.sup., concha superior; Ton.phar., tonsilla phrayngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; C.inf., concha inferior; C.med., concha media; H.semi., hiatus semilunaris; Proc.unc., processus uncinatus.

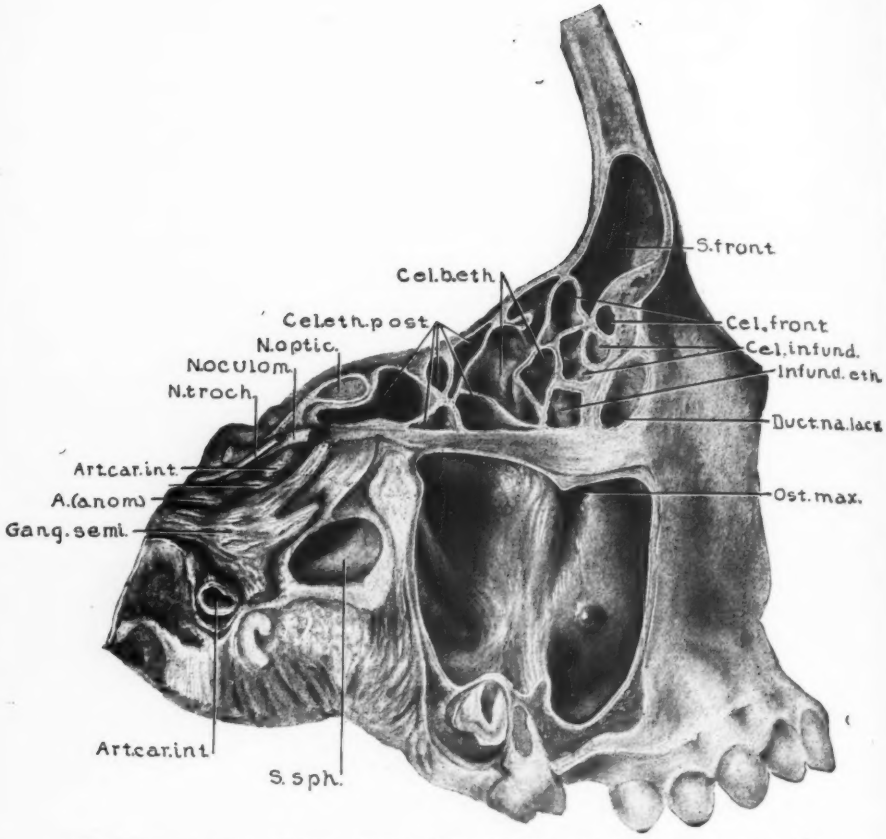

Fig. 23.—Specimen Fifteen Years, Nine Months and Twenty-six Days Old. (Series D, No. 76.)

Lateral portions of the frontal, ethmoidal, maxillary and sphenoidal areas have been removed by sagittal incisions. Note the marked extent of the sinus sphenoidalis into the pterygoid process. The ridge which is seen on the floor of the sinus sphenoidalis overlies the nervus canalis pterygoidei (Vidii). The sinus maxillaris extends 11 mm. below the level of the nasal floor. S.front., Sinus frontalis; Cel.front., cellulæ frontales; Cel.infund., cellulæ infundibulares; Infund.eth., infundibulum ethmoidale; Duct.na.lacr., ductus nasolacrimalis; Ost.max., ostium maxillare; S.sph., the portion of sinus sphenoidalis extending into the pterygoid area; Art.car.int., arteria carotis interna; Gang.semi., ganglion semilunare; A.anom., anomalous branch of carotid artery; N. troch., nervus trochlearis; N.oculom., nervus oculomotorius; N.optic., nervus opticus; Cel.eth.-post., cellulæ ethmoidales posterior; Cel.b.eth., cellulæ bullæ ethmoidales.

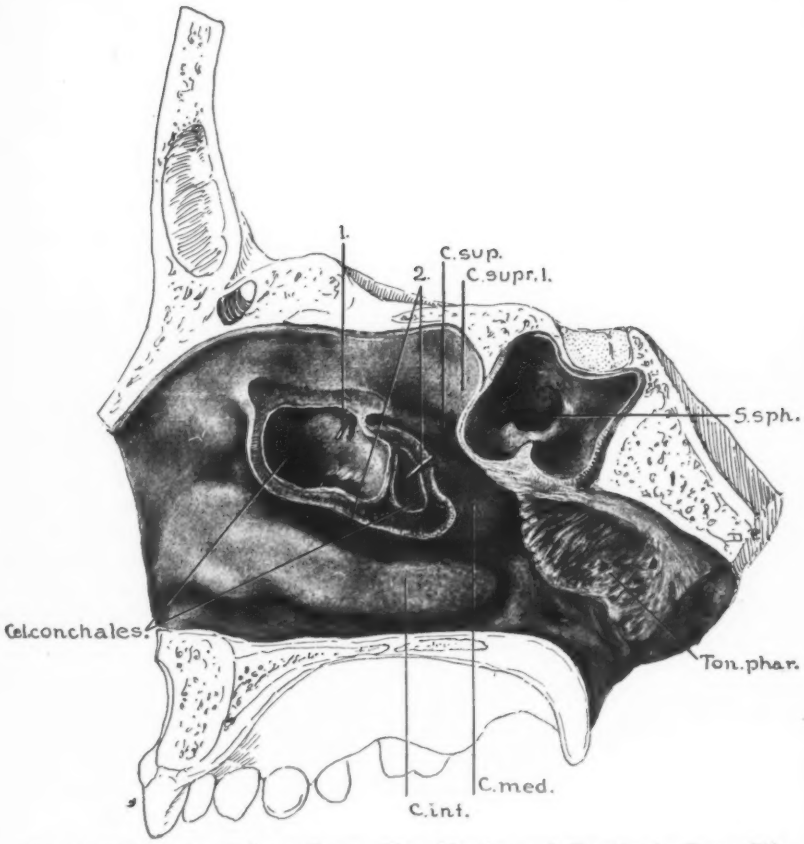

Fig. 24.—Specimen Fifteen Years, Nine Months and Twenty-six Days Old. (Series D, No. 76.)

Lateral view of this specimen is shown in Fig. 45. Sagittal section, showing the sinus sphenoidalis and a portion of the lateral nasal wall. There was in this case a marked deviation of the septum nasi toward the left, and a compensatory increase in the size of the concha media. Note the presence of the cellulæ chonchales. The anterior conchal cell has its origin as an extension from a posterior ethmoidal cell, just anterior to the superior meatus, while the posterior conchal cell developed from the posterior portion of the suprabullar furrow. 1. Probe through ostium of the anterior conchal cell; 2, probe through ostium of the posterior conchal cell; C.sup., concha superior; C.supr.I, concha suprema I; S.sph., sinus sphenoidalis; Ton. phar., tonsilla pharyngea; C.med., concha media; C.inf., concha inferior; Cel.conchales, cellulæ conchales.

LVI.

THE SPANISH GRIPPE IN SWITZERLAND.

By J. Holinger, M. D.,

Chicago.

Since June, 1918, a serious epidemic of the "Spanish grippe" has been raging in Switzerland. The following points taken from a paper edited by a nephew of the writer may be of interest:

The infection travels from person to person. Complications, pneumonia, nephritis, meningitis, are very frequent and very serious. Young and strong people, from eighteen to thirty-five years of age, are most frequently attacked. Its contagiousness is well shown by the following: A small number of men gathered together at a meeting in a village. One of them was beginning to feel ill. He infected seven of them; three died. In another village there were four deaths in one house. Physicians and nurses were everywhere among the first to contract the disease.

The symptoms appear rather suddenly. They are dizziness, headache, pain in different parts of the body, fever, the well known nose and nasopharyngeal symptoms—malaise combined with a feeling of extreme weakness. People on the street, soldiers on the march, were overcome and had to be carried away.

The diagnosis, on account of the epidemic character of the disease, is not difficult.

The course is recovery after three to five days, if no complications set in. The complications are bronchopneumonia, often double sided, nephritis, and meningitis may appear, early or late.

The influenza bacillus was positively identified as the cause of the disease.

The treatment is mainly symptomatic: Rest in bed, calomel, salicylates, aspirin, salipyrin. Prompt results were reported from intravenous injections of neosalvarsan, which is even considered a specific.

The prophylaxis is discussed in articles and pamphlets issued by the government and local health authorities. Smoking and alcohol offer no protection. Cleanliness of the mouth and nose and open bowels are necessary. The first is accomplished by frequent rinsing of the mouth and gargling with water containing one to two tablespoonsful of hydrogen peroxid to a glass of water. The nose is douched with lukewarm water with a teaspoonful of table salt to a glass. In many towns the streets were sprinkled with antiseptic solutions. In some places all gatherings of people were prohibited; the schools, churches, theaters were closed. Unnecessary traveling is discouraged, especially for patients and convalescents, since complications are so much more frequent, and the infection may be spread. The hospitals were so overcrowded that many had to be closed, and schoolhouses and other public buildings used for taking care of the sick. Emergency barracks had to be erected. The Red Cross, which has been carefully organized in every town and hamlet for more than thirty-five years, was of enormous benefit. A gift of one hundred thousand dollars from the American Red Cross to the Swiss Red Cross to alleviate the suffering is mentioned with special gratitude.

LVII.

TWO CASES OF SINUS THROMBOSIS WHICH PRESENTED UNUSUAL DIFFICULTIES IN DIAGNOSIS.*

By E. Ross Faulkner, M. D.,

New York.

Case 1.—I saw this boy first, April 15th, with another physician at his office. He had then a profuse purulent discharge from his left ear. For two weeks he had had this condition accompanied by considerable pain. He was going to the physician's office for observation and was carrying out irrigation at home.

Three years previous to this, he had had an acute otitis media in the same ear which had entirely cleared up. At that time he looked rather ill, but he had always been delicate looking. Two myringotomies had been performed and drainage was free. He had had no chills and no marked tenderness over the mastoid region. On April 21st, the physician told me that he was sending him to the hospital under my care. When I saw him, after admission, his temperature was 100.4° and pulse 82. There was no discharge from the ear and no tenderness on deep palpation in the mastoid region. He looked more ill than the local symptoms would warrant. Later in the day his temperature went up to 104.8°. A myringotomy was performed by the house surgeon. The next morning the temperature was down to 102°, later on, however, going up to 106°, accompanied by very severe headache. He was seen by several of my colleagues at the hospital, and although there was not much to be seen in the middle ear, I decided to open his mastoid. I did quite an extensive simple mastoid, but found nothing to account for the symptoms. On exposure the dura and sinus looked healthy—in fact, the appearance of the mastoid was that of one undergoing resolution. His blood count had given no

*Read before the New York Academy of Medicine, Section on Otology, May 10, 1918.

positive evidence, there being a slight leucocytosis with about 78 per cent of polynuclears. The blood culture was taken on the day of the operation, April 23rd. The night after the operation he had severe pain in the right shoulder. The next day this was slightly swollen and immobilized. In the afternoon his temperature went up again to 104.4°; dressing showed no pus either from the wound or from the middle ear. The following day the report from the blood culture showed the presence of streptococcus viridans.

The physical examination by the medical attendant, Dr. Howe, showed lungs negative, a slight systolic murmur at the apex of the heart, but this was not considered due to endocarditis. At this period, therefore, there were clinically a pyemic temperature, with pulse rate usually under 100, the mastoid to all appearances undergoing resolution, apparently an embolic process in the right shoulder, with streptococcus viridans in the blood. It was most improbable that the focus of origin was in the ear. In fact, so far as I knew, no case of streptococcus viridans in the blood had been reported with a primary focus in the ear.

Dr. Dwyer, the pathologist, substantiated this view. The patient's teeth and tonsils were both badly infected, and, as either of these are more likely the habitat of the streptococcus viridans, we took cultures from both these regions, but found only diplococci present. For the next four days the patient had a pyemic temperature with a constant daily rise to 104 or 105 degrees, with remissions in the morning down to 100 or 101 degrees. There were no chills, and the pulse rate ranged from 84 to 108, most of the time below 100. The case was in the meantime subject to much consultation, and I could hardly mention the number of otologists who saw him, some advising operation and some against it.

With the streptococcus viridans in his blood, operation seemed hopeless, besides it was most unlikely that the blood infection could have come from the ear. On the other hand, it was argued that if he were going to die anyway, he should be given the odd chance of exploring his sinus. To this I agreed without much hope for ultimate good.

On exposing the sinus from the bend downward, the wall appeared quite healthy. However, I kept on going toward

the bulb. Suddenly, to my surprise, pus began to well up in considerable quantities. A perisinus abscess had been tapped around the bulb. The jugular was ligated and the bulb cleared of the clot. The culture from the pus in this region showed streptococcus hemolyticus.

The patient's temperature came down by a step-like process in the next week. His ear entirely cleared up and he has remained well ever since.

Case 2.—This patient was first seen September 28, 1917. He came to the clinic with a very severe pain over his right eye and looked very ill.

Since an attack of whooping cough in childhood, he had had a periodical discharge from his right ear. Three weeks before admission, his ear began discharging, and he had had severe pain in the right frontal region, varying in intensity at different times of the day. Up to that time there had been no pain in the ear. He had been treated in another hospital, and an operation on his ear had been discussed. On admission there was no evidence of any discharge, but there was a large perforation in the drum membrane, with no pain or tenderness over the mastoid. What pain he had was all located in the right frontal region. His hearing was markedly impaired on that side.

For the past week he said he had had a severe chill every day but not recurring at the same time of the day. The patient was X-rayed, both frontal and mastoid regions, but nothing was found. Shortly after admission, he had a chill and his temperature went up to 105°. The next two days he had a daily rise to about 104° with chills at less than twenty-four hour intervals between these daily rises.

I advised operation but patient refused. He thought he had malaria. This seemed, of course, possible. With the entire absence of local ear symptoms, we were inclined to eliminate every other possible cause. One aurist, for whose opinion I have a great respect, said that he would want to give the ear the last consideration as the cause of the phenomenon. Repeated examinations for malaris were negative; the possibility of pyelitis was eliminated; lungs and heart were negative; blood count showed 77 per cent of polynuclears, but this did not tell us much; blood culture was negative.

On the fourth day his temperature remained down and he had no chill. The fifth day, October 2nd, there were two sharp upward variations, the last one accompanied by severe chill and reaching 106.8°. Such a phenomenon with a double rise of temperature in twenty-four hours, I believe to be pathognomonic of a pyemic process and nothing else. Moreover, it is significant of absorption into a large vein, such as the jugular or uterine veins. I was now fairly certain that he must have a sinus thrombosis, although there were still no localizing symptoms in the ear or neck, and the pain was still confined to the frontal region. The patient's consent for operation was now obtained, October 4th, and the operation performed on the following day. The sinus wall above near the bend looked suspicious only, but on following it down it appeared thickened and of a grayish color. There was no perisinus abscess or granulations on the surface. I put in some compression plugs at each end of the exposure. I then ligated the jugular above the facial. There was no evidence of disease of the jugular. A free incision into the exposed sinus liberated liquid pus with free bleeding from the torcular end. This end was packed and a portion nearer the bulb opened further. A little more pus was obtained. The exposure was now down to the bulb. Very free bleeding occurred, probably from the inferior petrosal. This was packed off and dressing applied, and the patient returned to the ward. The temperature remained down until the fourth day, when it went up to 105°. All packing was then removed and a small quantity of pus was seen coming from the region of the bulb. The packing was loosely inserted in this region and changed daily, considerable pus being present at each dressing.

From that time on, his recovery was uninterrupted. A radical mastoid was performed five weeks later.

LVIII.

LEUCOCYTOSIS OF THE SPINAL FLUID IN THE DIAGNOSIS OF MENINGITIS.*

By Chas. E. Perkins, M. D.,

New York.

I desire to present a few observations and refer to several cases bearing upon the value of the count, numerical and differential, of the spinal fluid cells, as furnishing evidence in the diagnosis and management of various complications of purulent otitis media.

The spinal fluid normally contains somewhat under ten cells to the cubic millimeter, and these are lymphocytes with perhaps an occasional endothelial cell. There should be no polymorphonuclears. A rather large number of diseases are capable of increasing the number and changing the character of these cells. Nevertheless, when, following a purulent middle ear process, one has clinical evidence or has reason to expect meningeal involvement, the change in the kind and number of leucocytes of the fluid obtained by lumbar puncture, in conjunction with certain chemical tests, affords one valuable evidence. In such cases, however, one seldom, if syphilis is excluded, will make a mistake in attributing the leucocytosis to the process complicating the otitis media.

Considered from an otologic standpoint, the presence of an increased leucocyte count with a substantial polymorphonuclear percentage, indicates that an inflammation exists either within the meninges themselves or in their immediate proximity.

It is evident that if the subdural space has become generally infected one of the products of inflammation—that is, pus—will be found in the cerebrospinal fluid. In the first stages the cell count will be low and will more or less rapidly mount, until as death approaches it may be well into the thousands. The polymorphonuclear percentage also increases

*Read before the New York Academy of Medicine, Section on Otology, May 10, 1918.

to above 90 per cent in some instances. If, however, the process becomes circumscribed, the cell count will not mount so rapidly unless the barrier adhesions give way and the process becomes general. The fact that the meningitis can become circumscribed, although quite extensive, accounts for some reported instances of death from meningitis, verified postmortem, with normal spinal fluid. Thus the process has been sufficiently extensive to result in a fatal termination from changes in the brain cortex, absorption of toxins, etc., without extending to the spinal system or allowing the products of inflammation to reach the lumbar enlargement.

In the other group of cases, the inflammatory process is in immediate proximity to the cerebrospinal spaces, which may not be invaded by bacteria. Leucocytes may migrate into the spinal fluid as they do into the tissues in the neighborhood of any severe inflammation. This explanation I believe accounts satisfactorily for many of the cases of socalled serous meningitis which we observe. As the serum also finds its way along with the white blood cells into the cerebrospinal fluid, it is customary to find in these patients a positive serum globulin test. As instances of processes which may bring about this condition may be mentioned brain abscess, extradural abscess, sinus thrombosis and labyrinthitis.

In brain abscess the increase in cells and amount of cerebrospinal fluid is undoubtedly often caused by the approach of the abscess cavity to the cerebral cortex. This allows the migration of white blood cells and transudation of serum into the cerebrospinal spaces. This will especially occur in noncapsulated abscesses, and in those in which there are no limiting meningeal adhesions. In abscesses of the brain substance other factors doubtless may be responsible for the leucocytosis and increase of spinal fluid. If the abscess approaches the lateral ventricle, and all located in the temporosphenoidal lobe are almost of necessity in proximity to the ventricle, the above process may affect primarily the fluid within this cavity, and secondarily, the general cerebrospinal fluid through the canal system of the ventricles. That is, from the lateral through the foramen of Monro to the third, the aqueduct of Sylvius, to the fourth, and out through the foramen of Majendie. Moreover, it is not at all impossible that

the abscess itself may produce an effect upon the choroid plexus in the ventricle of the side involved, and as these structures are generally recognized as being connected with the production of the cerebrospinal fluid, it is in no way unreasonable to suppose that this sort of involvement of the ependyma might result certainly in the increase of the fluid, perhaps also in the amount of its cellular constituent.

In connection with the canal system of the ventricles, a fact may be called to your attention which is not at all new, and that is that a cerebellar abscess may cause sufficient pressure upon the posterior part of this system to prevent the drainage of the lateral ventricles, thus producing a sort of internal hydrocephalus. In one patient, in whom the symptoms were obscure but evidently pointed to a brain abscess, exploration of the temporosphenoidal lobe gave exit to fluid under marked pressure, the ventricle being entered at much less depth than normal. This led to the recognition of the location of the primary process and the evacuation of a cerebellar abscess.

In inflammation adjacent to and involving the external layers of the dura, which later extends to the meninges, there is often no doubt a stage of varying length, while the products of inflammation are escaping into the subdural space, which antedates the invasion of this space by the bacteria causing the process. In this stage there may be found in the spinal fluid the serum globulins in abnormal amount, or besides these an increased leucocytosis. Meningitis recognized in this stage responds to treatment. A case among several in illustration may be cited:

The patient, a girl about seven years of age, was under the care of Dr. Bowers, at St. Luke's Hospital. She had symptoms of meningitis with spinal fluid showing a cell count well into the thousands to the cubic millimeter. A mastoid operation with the evacuation of a large extradural abscess resulted in recovery. If, in these patients, after evacuating the extradural abscess, there is no improvement after twenty-four or forty-eight hours, and especially if the spinal fluid culture should be positive, incision of the dura doubtless offers the best prospect of any interference.

As illustrating the effect of an infective focus in the venous sinuses, I may allude to a case of Dr. Kahn's, which was

reported before this section last winter, and which, so far as I know, is unique.

The patient, an adult male, had a mastoid operation and jugular resection. The sinus was explored, free bleeding obtained from below, but the upper end for some reason was not interfered with, leaving this clot in situ. He did very well for three or four days, when symptoms of meningitis developed—headache, delirium, fever, etc. The spinal fluid taken at that time was reported upon by Dr. Dixon as follows: "Spinal fluid, pus," so great was the number of leucocytes, and yet this patient made a complete recovery upon removing the clot which had been left in the torcular end of the sinus. Notwithstanding this apparent exception, I believe it is a rule that the greater the cell count and the higher the polymorphonuclear percentage, the more serious is the condition. The exception in this case was perhaps due to the thinness of the internal wall of the sinus, which allowed the migration of leucocytes in enormous numbers. Why bacteria did not also escape and institute a general meningitis seems to be a stroke of fate, fortunately of the beneficent kind.

The labyrinth, as is well known, offers the most frequently traveled route for infection to pass from the middle ear to the meninges. The question naturally arises if there may not be, in many instances ,a period after the development of a purulent labyrinthitis and before general bacterial invasion of the meninges, when the spinal fluid will show the imminence of this occurrence. If so, it would be of paramount importance from the standpoint of treatment, as it represents the latest point of time in which we can reasonably hope that operative interference will be successful. I do not wish to be understood to advise postponement of the labyrinth operation until there is a leucocytosis of the spinal fluid. But if one chooses to adopt the socalled "conservative" treatment of purulent labyrinthitis, in the hope that it will pass into the latent stage and cause no more trouble, one surely should not wait after the spinal fluid begins to show changes, although to be fair I will later refer to a case pointing otherwise. First, however, I desire to refer briefly to two

cases bearing upon the leucocytosis associated with labyrinthitis:

An adult male, upon whom I performed a radical operation, developed purulent labyrinthitis on the following day, with total deafness, nystagmus, vertigo, etc. The spinal fluid taken fourteen hours after the onset of the vertigo and nystagmus, showed a cell count of 145, polymorphonuclear percentage above 60. Labyrinth operation with opening of the internal auditory meatus and removal of the modiolus was done a few hours later. The patient lived and is alive today after more than two years—a healthy man, although minus the function of one ear. The culture and complement fixation test for syphilis were both negative.

Another patient, whose case I propose to report in full later, had all of the symptoms of meningitis following a purulent labyrinthitis of about a month's standing. Examination of the spinal fluid showed 15 leucocytes, with a few polymorphonuclears. On the following day the laboratory report was 512 cells with polymorphonuclear percentage of about 60. Labyrinth operation and decompression cleared up the meningitis, although the patient died four months later with obscure symptoms of some intracranial lesion. His spinal fluid, however, remained normal to the end. I felt that my operation in these two patients was timely and well adapted to the requirements, and I still feel so, notwithstanding the following case:

The patient was under Dr. Kahn's care. Following a radical operation there developed a purulent labyrinthitis with an abnormally high cell count of the spinal fluid, with a substantial polymorphonuclear percentage, and although no operation was done the patient recovered. This case evidently shows that it is possible, even after the spinal fluid has shown a meningeal reaction to an offending labyrinth, for the process to become walled off by barrier adhesions and pass into a quiescent or latent stage. To postpone the operation of labyrinthectomy, expecting such an outcome in an instance of this kind, is the very absurdity of conservation.

We thus see that the leucocyte count of the spinal fluid is able to give us early information in a patient in whom we are fearing the onset of meningitis, and that at a time when treat-

ment of a surgical nature may be undertaken with a prospect of success. Whether or not the determination of the presence, number, or percentage of the polymorphonuclears alone would do this I am unable to say. I do know, however, that through many years the reports from the laboratory have come in the form of the total count, together with the polymorphonuclear percentage, and that I have found these reports very satisfactory and would not readily forego the information gained from the total count. From this, one forms an idea of the intensity of the process, and as the disease progresses the count offers a good, if not the best, indication of its favorable or unfavorable tendency. This does not hold true if fluid for the purposes of medication has been injected into the lumbar sac. Serum or other liquid preparations tend to dilute the spinal fluid, and on a subsequent puncture the leucocyte count may be less, although the disease is progressing favorably.

The report on the cells in conjunction with the result of the globulin test comes very soon after the fluid is withdrawn, and operation may be instituted without waiting twenty-four hours or more for the report of the culture, which may or may not be positive in a case of purulent meningitis.

I have had two patients, whose meningitis ran to a fatal termination, one confirmed by autopsy, the other with a typical history, in neither of whom did the spinal fluid give a positive culture, although numerous specimens from each were cultivated.

The greatest difficulty often arises in making a cell count of the spinal fluid that will be of value when there is admixture of blood. In an instance of this sort the test for the globulin is, of course, strongly positive, and one usually relies on the culture. Two instances in this connection may be mentioned.

In the first, the diagnosis of meningitis was verified by autopsy. Clinical history obscure. Blood in spinal fluid from three punctures made at intervals. Fehlings positive. Culture negative. Dr. Dixon thought the fluid obtained at the first puncture showed leucocytes out of proportion to the red blood cells as found in the patient's blood.

In the second, the patient was convalescing from meningitis when a temperature of 103°, with severe headache, influenced me to have the spinal fluid taken. Blood was drawn with the fluid. After comparing the differential count of the fluid with that of the patient's blood, I concluded that these symptoms were not caused by a recrudescence of the meningeal process, and subsequent progress of the case established the accuracy of this opinion.

In conclusion, I would say that one should always be on the lookout for other diseases which give a leucocytosis of the spinal fluid, especially syphilis in its various forms. All laboratory reports should be considered as aids to clinical observation. Viewed in this light, I regard the cell count of the spinal fluid, with the determination of the polymorphonuclear percentage, as one of the most important laboratory aids in the diagnosis and management of meningitis.

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LIX.

BENIGN NEOPLASMS OF THE NASAL SEPTUM.*

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While under the impression that benign new growths of the nasal cavities were not common, it was rather surprising to note that Hasslauer in an investigation in 1900 found less than 300 cases reported. Of these only 115 were true new growths, and 57 of this group were angiomata. The remaining 58 were classified as follows: Papillomata, 35; fibromata, 9; myxomata, 6; chondromata, 4; adenomata, 4. From the fact that no osteomata and but four ecchondromata were shown in this list, it must be assumed that the investigator was more than careful to rule out exostosis of the septum, as there have been a considerable number of true bony or cartilaginous tumors of the septum as well as papillomata, etc., reported since his article was written.

As to the etiology of these growths, Kyle apparently voices the best fortified opinion by saying that, like all benign tumors, they have no assignable cause for existence.

In contradistinction to malignant growths which most commonly occur in the regions about the outer wall of the nose, benign growths usually appear on the septum, and for some unknown reason show a predilection for the lower part of the septum.

The clinical reports of cases, as studied, showed as a rule, no distinctive subjective findings, the history being that of a unilateral nasal stenosis of a varying degree of rapidity of development. The concomitant symptoms, such as excess or altered secretion, hemorrhage, pain, local or referred, etc., were, as a rule, in no way diagnostic. The exceptions to the above statement included cases of angioma in which hemorrhage was the dominant characteristic, and fibromata, chiefly, of long standing where the growth attained such size that by pressure, deformities of the external nose or invasion of surrounding structures resulted.

In practically every case examination by inspection and by the probe rendered simple the determination of the character of the growth.

As with similar neoplasms elsewhere in the body, definite surgical procedures for removal have been more satisfactory than electrolysis, X-ray, radium, or cautery, either actual or chemical. The extent and character of the surgical intervention naturally varied with the size and nature of the tumor mass, and ranged from a simple snaring off of a pedunculated growth, with or without subsequent cauterization of the base, to a resection of the superior maxilla to give access to a growth of exceptional size involving other structures than the septum.

As concerns the septum borne growths, only simple measures were usually required. Practically no complications were reported except hemorrhage, and in the septal cases this had not been severe and had been controlled by pressure. Fibromata had apparently caused more trouble in this respect than had the other growths, except the purely vascular ones.

The relative frequency of recurrence in fibromata and adenomata should serve as a reminder of the narrow line of separation between benignancy and malignancy, and should impress on the operator the need of a thorough removal of all pathologic tissue.

The following is the history of another case in this category. Miss H. F., twenty-five years of age, seamstress, family and previous personal history negative. During the summer of 1915 she had done a great deal of swimming and diving, using no protection for the ears. In September, 1915, she began to notice a permanent sensation as of water in the right external auditory canal, a slight dullness of hearing on that side and, especially in damp weather, occasional sharp pains, darting in character, directed toward the nasopharynx. The amount of annoyance gradually increased until in December, 1915, she consulted her family physician, who ordered hot applications to the ear and some remedy internally for relief of pain. Receiving no benefit, she was referred to me in February, 1916. No nasal symptoms were volunteered, but on questioning she acknowledged a slight feeling of stuffiness in the right naris and occasional right frontal headache.

General health unimpaired. Examination showed a healthy, well nourished young woman, skin and mucous membranes good color, no external deformities of nose or auricles; pharynx and larynx, normal; external auditory canal and drum membranes, normal except slight retraction of right drum. Left naris, normal; right naris, I was unable to see past anterior end of inferior turbinate, the entire cavity being filled by a tumor mass. This mass was lobulated, fairly firm in consistency, covered with a normal, healthy mucous membrane with no signs of congestion, no ulceration, no abnormal secretion and not especially sensitive to manipulation. I was wholly unable to discover its point of origin, so anesthetized as best I could with 10 per cent cocain in 1/5,000 adrenalin, which had no apparent effect on the size of the mass, and removed the anterior portion with a snare. This enabled me to locate the pedicle low down on the septum and remove the rest of the growth intact. The loss of blood was practically nil. The pedicle was not more than one-eighth of an inch in diameter and was located one and one-fourth inches from the anterior nasal spine and one-fourth inch from the floor of the nose. The entire tumor mass was approximately one and one-fourth inches long, one to one and one-fourth inches in vertical measure, with an irregular transverse measurement because of the manner in which it had moulded itself about the turbinated bodies. The nasal mucous membrane showed no effect from the pressure of the growth except a slight pallor, and the turbinated bodies seemed somewhat atrophied.

I regret that through carelessness the gross specimen was lost, but sections had been made from which I had two slides prepared, showing that the growth should be classed as adenoma.

This patient has been seen several times since, the last time six months ago, and there was then no sign of a recurrence of the growth, and no return of the original symptoms.

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LX.

RADIUM IN DISEASES OF THE EAR.*

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The decade from 1895 to 1905 has been described by someone recently as the most remarkable in history for the number of great primary discoveries. It was near the beginning of this period (1898) that Professor and Madam Curie made the startling announcement to the scientific world of their discovery of a new metallic element which they called "radium" and gave a description of its wonderful powers. Since that time the element has been exhaustively studied and today we are fully acquainted with its physical properties.

Soon after its discovery the medical profession was attracter to it, and it has been tried in one form or another in the treatment of almost every ill to which the human flesh is heir.

In the field of otolaryngology it has been used chiefly in the treatment of diseases of the larynx, and Polyak, Killian, Abbe, Freudenthal, Coakley and the writer among others have employed it more or less extensively in that domain of medicine. So far as its employment in diseases of the ear is concerned, the literature is very scanty. Most of the work has been done by German otologists and is characterized by their usual thoroughness and care. These reports show that radium has been employed in the treatment of almost every form of ear disease during the past ten years. It has seemed to us that the present time is a fitting one to inquire what it has accomplished and just what we may fairly expect of it.

Properly to answer this question it is desirable that we should recall briefly some of the more important physical qualities of this metallic element.

In the first place, as is well known, radium resembles the solar spectrum in giving forth three principal kinds of rays which are distinguished from one another by their varying power of penetration and by the difference in the effect pro-

*Read at the annual meeting of The Oto Laryngological Society, June, 1917.

duced. The alpha ray is so feeble that it penetrates scarcely, if at all, beyond the skin. The beta ray is stronger, but the greatest depth of penetration is obtained with the gamma ray, a distance of from 9 to 10 cm. The alpha ray has a decidedly cauterizing action, a quality which is entirely lacking in the gamma ray, which possesses the peculiar quality of the metallic element in destroying tissue. For therapeutic purposes therefore the alpha and the soft portion of the beta rays should never be used. A failure to recognize this fact has led, as we shall see later, to serious error on the part of at least one of the observers who has reported his results, and is sufficient in itself to disqualify his findings.

To secure the proper therapeutic result then, it is necessary that the radium should be screened. It has been found that even a thin screen of paper is sufficient to cut out the alpha rays. To exclude these and the soft beta rays, however, a filter made of lead usually has been employed. Only second in importance to the character of the rays used is the dosage to be employed. This demands much experience, and in many cases, no little judgment. In small dosage radium stimulates tissue growth. In large doses it is a destroyer of tissue. Undoubtedly many of the failures reported are due to the fact that not a sufficient sized dose was used, or what is equivalent, a small dose was not used for a sufficiently long time. Another important point is as to how often the applications should be made and how many in all will be required. Here authorities differ. In the German clinics the small dosage has been the practice, repeated bi- or triweekly for a period of from one to three months. In this country, we have believed more in the massive dose applied at longer intervals and then for only a few times.

It is as true of radium as we know it to be of salvarsan that we are dealing with a powerful and dangerous agent, so we should never lose sight of the fact that we may do harm with it as well as good. Personally we have seen no ill results, but recently we have been informed of a case where radium was applied to the larynx externally for carcinoma with the disappearance of the growth, but where later a stenosis of the esophagus has developed.

All the investigators who have employed it in the ear have

made use of the metallic element itself and not of the emanations which have been used elsewhere with such good results. Only so far as superficial growths of the ear are concerned would the observation apply that the skin is disposed to carry away the radium energy, and so with advantage can be frozen or otherwise treated to avoid this.

One of the unsettled questions in connection with radium is exactly what takes place in the disappearance of the growth. One theory that has been frequently advanced, especially in the case of malignant growths, is that the element heightens autolysis. Another striking fact is that pathologic tissue is far more susceptible to the radium ray than normal tissue. It would appear that in large doses the radium causes a necrosis of the tissue.

Among others who have studied the effect of the drug on the ear are Ewald and Marx, who conducted a series of experiments upon the labyrinth. Their work was independent of one another but agrees in showing that, applied in the auditory canal of guinea pigs, it causes a complete loss of hearing. This, it is interesting to remark, often did not take place immediately, but sometimes several months after the introduction. Marx found postmortem complete destruction of the organ or Corti.

With this short introduction let us consider in detail the various clinical reports on the subject which we have succeeded in assembling. First, as to the results obtained in chronic deafness. Here the case reports are so mingled that it is impossible to divide these into those cases dependent upon middle ear disease as distinguished from those where the internal ear was alone or chiefly involved. Ten men have reported their results. Of these three only make favorable reports. Hugel in Germany, Lake in England and Bryant in this country.

Hugel's work was done in Passow's Clinic in Berlin, and his results are so remarkable as to receive the designation from one of his critics of "being a fairy tale." He made use of the radium without any screen and employed five mg. from one to two minutes upon the mastoid or for half a minute within the canal.

Lake's experience with radium is limited to a single case

of otosclerosis where applications of one-half a mg. introduced for twenty minutes in a silver tube in the auditory canal at intervals of four days gave marked improvement to the hearing.

The report of W. Sohier Bryant appears in the New York Medical Record for 1914 and is a careful analysis of twenty cases or forty ears where he has employed the metallic element. These forty ears are divided into nine cases of otosclerosis, twelve of atrophic middle ear catarrh, thirteen of residual O. M. P. C., three of hypertrophic middle ear catarrh and two of nonsuppurative labyrinthitis. His results show improved hearing in thirty-three ears, decline in hearing in one, unchanged in six. These six were cases of residual O. M. P. C. There was marked improvement in fourteen ears—six atrophic, two hypertrophic, one nonsuppurative, three otosclerosis; in six ears there was a restoration to normal of the hearing. These represented two following O. M. P. A., two hypertrophic middle ear, two atrophic O. M. C. C.

Bryant also gives in detail (New York Medical Journal, July 4, 1914) the report of a case of middle ear deafness caused by chronic suppuration where radium was employed with benefit to the hearing and the tinnitus which was present. The patient was a woman of fifty-four years, who had been operated upon for recurrent mastoiditis and chronic middle ear disease. She complained of loud and persistent tinnitus. The hearing was lost in the left ear and greatly reduced in the right. Radium was applied at intervals of five or six days, presumably three applications in all. Five mg. of mesothorium bromid were used. "After the first application the tinnitus was relieved. After the last application it stopped and has never returned. The patient hears the voice now apparently well. Her intellect is clear, and from a person almost totally deaf and indifferent she became observant and responsive."

The remaining seven observers failed to obtain satisfactory results. Of these Passow, Dreyfuss, Hegener, Bruhl and Henlein followed accurately the technic of Hugel. Bruhl used eight mg. carried deep into the canal in a lead filter without improvement to the hearing. Henlein's study is a careful one. Only one case in his series showed any improvement by

actual functional tests. Passow is strongly of the opinion that it is of no value for the improvement of the hearing. Albrecht applied it in nineteen cases of hard hearing; eleven otosclerosis, two chronic middle ear disease with tinnitus, two chronic middle ear without tinnitus, four disease of the inner ear. No improvement in the hearing was obtained in any of them.

The most careful and exhaustive report in the literature is that of Victor Urbantschitsch. In addition to employing radium for many other conditions he gave it a careful trial in chronic deafness. Seventeen cases of hard hearing, many of them with an old perforation permitting introduction through the drum, were treated with radium. Five showed no improvement at all. Twelve he describes as "naherverfolgt." It is his conclusion that good results have been secured and can be secured in such cases occasionally, but, on the whole, the results are poor.

Fraser in an extensive report on the use of radium at the Royal Infirmary in Edinburgh refers to two cases of otosclerosis and one of chronic middle ear deafness where radium was used without benefit. He is of the opinion that nothing can be expected from its employment in such cases. What comment is to be made upon these several reports?

In the first place, they are limited in number. The work in most of them, however, has been carefully carried out so that we are able to draw a pretty fair conclusion. The first thing that strikes us is the striking discrepancy between the findings of Hugel, Lake, Bryant and the others. The report of Mr. Lake, while it is decidedly encouraging, concerns a solitary case, and the imporant factor of suggestion has apparently not been taken into consideration. To this Henlein has given the weight to which it is entitled. In the series of cases which he studied, the treatments were part of the time with the lead filter alone without radium, and at other times with the radium in the filter. With each method he succeeded in getting improvement in the hearing subjectively, and he reached the conclusion that suggestion and hysteria were accountable for the remarkable results which Hugel reported that he had obtained in his patients. He directs attention also to the fact that, with the application of the

radium only to the mastoid, as Hugel did, a penetration deep enough to affect the internal ear was impossible.

If we exclude the case of Mr. Lake and regard as discredited the findings of Hugel, the only favorable report is that of Bryant. No one will for an instant question the sincerity of our fellow-member, and a perusal of his article cannot fail to leave the impression that his work was conscientiously done. Accurate tests, however, are wanting in the cases reported, and it may fairly be questioned whether we all would agree with the diagnosis which were made, and also with the results which were obtained. Here, as in Hugel's case, always the possibility of suggestion has to be borne in mind. So far then as hard hearing is concerned, we are forced to the conclusion that radium has been of no material benefit.

II.—TINNITUS AURIUM.

Hugel, Henlein, Brühl, Albrecht, Bryant and Urbantschitsch report results in the use of radium in the treatment of tinnitus aurium.

Hugel has had the same satisfactory responses which he reports in chronic deafness. We have already referred to the unreliability of Hugel's statements. Henlein, however, who has done his work with great thoroughness, makes a decidedly encouraging report. There was a lessening of the noise in eight cases where radium was employed, with an increase of the noise in only one.

Albrecht's results with radium, so far as tinnitus is concerned, were also encouraging. For the relief of intractable tinnitus he made use of the work of Ewald and Marx, and with the permission of the patient, succeeded in destroying the auditory nerve by the employment of radium in two cases. Everything had been tried for the tinnitus in the first case without relief, and finally, at the request of the patient, 23 mg. of radium were placed upon the promontory wall for thirty minutes for eight days. After five applications the hearing which remained had been entirely lost, together with the disappearance of the tinnitus.

The second case was an old radical with a severe tinnitus. Here there was no hearing except for the loud voice. To-

gether with the tinnitus there was severe vertigo. There was a normal labyrinth. After four treatments of from thirty to forty minutes with twenty mg. of radium, the tinnitus entirely disappeared after two and a half months. Objectively there was complete deafness, with a dead labyrinth.

Brühl reports the employment of radium in a similar manner, with destruction of the auditory nerve and cessation of the tinnitus. We have already referred to the relief of the tinnitus in a case reported by Bryant, where improvement in the hearing also was secured.

Six cases were treated for tinnitus by Urbantschitsch. In three it was lessened or relieved. Urbantschitsch's conclusions in this respect are the same as in regard to the benefit which may be expected from its use in chronic deafness, namely, that occasionally good results may be secured, but usually they are poor.

From these several reports we may conclude that radium offers more encouragement for the relief of tinnitus than when it is employed for the relief of hard hearing. Particularly does it seem indicated in intractable tinnitus where relief is imperative and where in the past a surgical destruction of the auditory nerves was necessary.

III.—VERTIGO.

The reports are meager in regard to the use of radium in vertigo. One of the two cases of Albrecht's previously referred to, where he employed radium for destruction of the auditory nerve suffered from severe vertigo as well as from tinnitus. The relief to the vertigo after four treatments of 23 mg. was just as complete as it was for the tinnitus. The case of Brühl in which he made use of radium with the same end in view was relieved of the vertigo at the same time as of the tinnitus. Finally Dreyfuss reports two cases where the vertigo disappeared from the use of a weak preparation of radium, .6 mg., used for fifteen to twenty-five minutes. It is clear here that no destruction of the auditory nerve was sought for or effected. Even with these few reports we are warranted in concluding that radium can be

employed with hope, if the condition is severe enough to justify the destruction of the labyrinth.

IV.—OTITIS MEDIA PURULENTA CHRONICA.

Urbantschitsch reports a case of chronic suppuration continuing after the radical operation, where epidermization and cessation of the discharge were secured in four sittings by the use of 17 mg., introduced in a film of rubber and paper. He further states that occasionally good results can be secured in chronic middle ear suppuration, especially in the tubercular ears of children. Here he has employed radium emanations with prompt results. In three cases the granulations were caused to disappear. In one case with caries present there was a healing of the caries fourteen days after the application of the radium. In three other cases of middle ear suppuration there was a drying of the discharge without a positive cure. Dreyfuss reports six cases of chronic middle ear suppuration in which a cure was secured in three. He was altogether unsuccessful with the use of the emanations in these cases. In this group of cases, as in those of vertigo, the reports are too few to warrant any sure conclusions. The most that can be said is that the results of Urbantschitsch, who was a most careful observer, are encouraging.

V.—NEW GROWTHS.

Finally, as to the results obtained in the treatment of new growths. It has been, as is well known, chiefly in the treatment of new growths that radium has been employed. Superficial cancer has, wherever situated, responded favorably. The literature in regard to the results obtained in cancer of the ear are equally satisfactory, provided that the cancer is located externally. Urbantschitsch reports a case of epithelioma of the ear muscle which was cured after repeated treatments extending over three months. The patient was a man of 73 years. The growth was a centimeter and a half in diameter and rapidly extending. Here 19 mg. of the radium were employed. The exposures were one to three hours. Recurrence and death occurred within a year.

The second case was one of sarcoma of the ear muscle in a patient of 40 years with a node in the auditory canal ex-

ternally, the size of a pea. Treatment one to three hours caused disappearance of the growth.

The third case was one of tuberculosis of ear muscle and canal and was cured.

The fourth case was one of lupus of the ear muscle with a possible cure.

Urbantschitsch states, that so far as the appearance of the ear after the employment of radium is concerned, the result is all that can be desired. The larger question is whether radium is of any value in deep seated cancer of the ear. Upon this subject unfortunately the literature is entirely lacking. A personal communication from Dr. Burnham of the Howard Kelly Hospital states that he has treated a number of cases of epithelioma of the ear with radium, and those in which there is not an extensive involvement of the bone and periosteum do very well. He does not state whether the epithelioma were entirely superficial or not. Presumably that is the case.

Dr. H. H. Janeway of New York reports that he has had virtually no experience with radium in malignant disease of the ear. One case of carcinoma of the external auditory meatus, where it was employed, did not do very well. His experience with external epithelioma of the ear is encouraging. We know of only one case beside the one which we are about to relate where it has been used for a malignant growth situated inside the auricle. This is a case reported by Dr. Joseph Bissel of the Radium Sanitorium of New York, and was a man of forty years. The epithelioma was a small one in the exterior auditory canal. Five applications of radium ten minutes at each seance completely relieved him of any apparent disease. It is too early to speak of the possibility of recurrence.

The history of our own case is of more than usual interest.

The patient is a man of thirty years, who was first seen four years ago complaining of difficulty in hearing which had existed for two years. He was not aware of any discharge, and there was no history of previous suppuration. There had been a nasal operation the preceding year. He stated that there was occasional pain in the affected ear. Examination gave complete loss of hearing in that ear. The eustachian

tube was open. There was a negative caloric and negative turning, showing that the labyrinth was dead. At the first examination there seemed to be a distinct deposit on the drum membrane. This later proved to be only a thickened and reddish drum. The landmarks could not be made out. There was no perforation of the drum and paracentesis failed to bring about discharge. A diagnosis was made of chronic labyrinthitis. In the course of the following month the pain in the ear increased and there were recurring attacks of hemorrhage. At this time an easily bleeding growth was recognizable, springing apparently from the floor of the canal. The canal seemed to be full of cholesteatomatous material. An X-ray picture showed apparent bone changes in the mastoid, and an operation was decided upon. This was performed in April, 1913. The removal of the growth from the canal was attended by severe bleeding. The examination of the tissue was not entirely satisfactory, but pointed to malignancy. (The report has been lost, so we are unable at this time to state whether it was epithelioma or sarcoma.) Prompt recovery took place, with no recurrence of the growth. Nine months later, while the drum could still be seen, there was a soft, nonbleeding mass on the floor of the canal. At this time an interesting complication presented itself, namely, a complete paralysis of the left vocal cord. The only explanation for this seemed to be in a metastasis into the glands of the chest, with pressure on the recurrent nerve. An X-ray picture of the chest, however, was entirely negative. The Wassermann blood test was also negative. The growth in the canal seemed to be threefold, on the floor, on the anterior wall, and on the posterior wall. The patient was not seen then for a year and a half. On May 9, 1916, a slight paralysis of the left upper eyelid had developed. He could only close the eye with difficulty. There was also partial paralysis of the facial muscles on the affected side. The voice was strong, although no change had taken place in the character of the paralyzed cord. Slight discharge from the ear was present. The growth now completely filled the canal. The drum was not visible. A second Wassermann was taken, and was also negative. It was evident that any operation must be extensive and the outcome far from encouraging. It was

accordingly decided to employ radium. Two treatments of thirty minutes of 25 mg. of radium produced a distinct shrinking in the size of the growth. There was no reaction. Three further treatments followed, also without reaction. The patient was seen next in October, 1916. During the summer he had continued in perfect health. Examination showed that the growth in the ear had not increased. If anything, it was smaller. A further course of three applications of radium was made. This time the amount used was the same (25 mg.), but the time of the application was increased to one hour. The growth has continued slowly, but distinctly, to recede, although at present the canal is still filled with the growth, beginning some distance inside of the external orifice. The patient has had no pain and very little discharge, and is able to do his work as a clergyman without any difficulty. It would be far from right to state that the case is in any sense cured, but in the patient's opinion, and our own, we feel that radium has given results far in excess of anything that could have been secured by radical surgical invention, and it is proposed to persist in its use.

CONCLUSIONS.

As a result of our study we regretfully are forced to the conclusion that radium, up to the present time, has failed to be of any considerable benefit in the treatment of diseases of the ear. So far as chronic deafness is concerned, it has proved virtually a failure. In the rare cases of intractable tinnitus and excessive vertigo, on the other hand, it can be employed with a reasonable hope of relief by its power of destroying the labyrinth. Finally, so far as malignant growths are concerned, it is of value when they are superficially seated. When deep seated there is nothing sufficiently encouraging to be said of it to warrant its use to the exclusion of operative measures where they can with propriety be adopted. The work that has already been done with it on the ear is not enough to condemn it "in toto," however, and it is to be hoped that other investigators will take it up and give it further thorough and careful trial.

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ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

A Case of Labyrinthitis Syphilitica.

SPINOLA, COLOMBOS.

Brasil méd., Rio de Jan., 1917—237.

After giving the history of the case, the writer states that the Babinski treatment was adopted, removal of the spinal fluid. Salvarsan was given and numerous intravenous injections of cyanide of mercury after equilibrium was reestablished.

Otitic Meningitis Without Suppuration of the Cavum Tympani.

EIRAS, FRANCISCO.

Brasil méd., Rio de Jan., 1917—333.

The author claims that the surgical intervention should not be postponed twenty-four hours in cases where there are meningeal symptoms, and reports one case where the pus was found in the mastoid antrum, and one, not operated, where the pus was found at autopsy.

A Survey of Ear Conditions in Young Children.

KOBLER, E. WILLIS.

N. York M. J., 1918—CVIII—66.

The writer has examined the ears of five hundred school children in New York City, and his observations have led him to the conclusion that discharge from the ears of young school children is more prevalent than is usually supposed. He points out that this is of vast importance as bearing on acuteness of hearing in later school life. The number of cases of impaired hearing in later school life, however, is relatively smaller, which may be explained by the fact that in many cases corrective treatment has been instituted and tonsils and adenoids removed. Many cases of defective hearing do exist nevertheless, and may be accounted for by the neglect and

refusal of parents to remedy defects, deformity of the nasal septum which cannot be corrected in early age, abnormal collection and deposit of cerumen, coupled with uncleanliness, catarrhal conditions of the nasopharynx with incomplete and insufficient instruction in nasal and oral hygiene, and the lack of adequate instruction in aural hygiene. Home remedies and adjuncts for earache are also frequently harmful. The author believes therefore that a special extended survey and examination of the ears of school children should be made with reference to the conditions mentioned. Emil Mayer.

Indications for Tubotympanic Insufflation With Thermal Waters (Sulphur-Soda).

FOURCADE.

Rev. hebd. de laryngol., etc., Paris, 1917—XXXVIII—295.

The author thinks that the value of insufflation with sulphur-soda mineral waters or their vapors lies somewhere between the estimates made by ardent advocates and equally ardent opponents. In France are three places where the method is currently employed, namely, Aix les Themis, Luchon and Canterets. Fourcade, who is at Canterets, thinks this treatment is reasonably efficacious in prolonged and recurring subacute tubal catarrh, chronic tubal catarrh, terminal stage of exudative catarrhal otitis, chronic exudative tubotympanitis, dry chronic adhesive otitis media, cicatricial otitis, and interstitial forms of otosclerosis. Contraindications are: Acute purulent otitis, chronic noncicatrized otorrhea, atrophic form of otosclerosis (otoarteriosclerosis), primary labyrinthitis and deafness from a central lesion. A. Miller.

Late Meningitis After Fracture of the Petrous Bone.

DE RUYTER, L.

Rev. hebd. de laryngol., etc., Paris, 1917—XXXIX—245.

The circumstances which give rise to an infection of the meninges, as well as the interval between the accident and the beginning of the meningitis vary considerably. It is needless to say that the danger of a meningitis is much

greater if a suppuration of the ear has existed prior to fracture of the petrous. Ordinarily, the trauma causes a fracture of the tympanic ring and a tear in the tympanic membrane; here the path of infection is evident. Otitis is particularly apt to follow ill advised treatment, such as lavage or instillations in the ear. But wounding of the ring or tympanum is not essential, for infection may occur by way of the eustachian tube, and Manasse reports such a case. Ruyter's case is similar. Two classes of delayed meningitis are to be noted: in one class the meningitis comes on early but remains subacute and latent for a time; in the other class the meningitis ensues only after a considerable lapse of time. Klestadt details a case in which the patient succumbed 209 days after the accident.

De Ruyter's case was of a man, aged thirty years, who was thrown from a motorcycle in July, 1914. He was examined a half hour later by a doctor for an insurance company. The patient had been able, with assistance, to walk to the consultation room. He answered questions normally, but could not clearly recall the details of his mishap, nor was he aware that he had been unconscious for a time afterward. He had bleeding from the left ear and left naris, showed abrasions about the occiput, complained of violent headache and pain in the region of the left temporal, and vomited several times during the examination. Pulse about normal. Diagnosis: Fracture of the base of the skull. The patient was taken to the clinic; iced compresses were applied to the head and a tampon was put in the left ear; no irrigations. For several days the headache continued; temperature ranged from 37 to 38 degrees C. The patient complained constantly of "something loose in his head." From the beginning hearing in the left ear was lost, there was tinnitus, and vertigo was almost constant.

In October, 1914, the patient was called for military service; his symptoms then were so slight that they were deemed to be functional, and for a time he was kept under observation as a traumatic neuropath. In December he was examined by an otologist, Dr. Quix. At this time the patient complained of deafness and tinnitus in the left ear, vertigo, difficulty in walking in the dark and impaired memory. Both

right and left tympani showed calcareous incrustations, but the left tympan was unbroken. Cranial perception of the fork was shortened for the left ear; air perception for the fork ranged from C to C^1. Weber lateralized to right. Left ear gave positive Rinné; Schwabach shortened. Rotatory nystagmus to left. Injection of cold water in left ear negative. Positive Romberg, patient falling backward and to left.

Suddenly, January 29, 1915, he was taken with intolerable headache. Progressively there set in a rise of temperature to 39, 39.6, 40.5 degrees C., with a pulse of 72, impaired vision, retention of urine, delirium, Babinski sign, exaggeration of tendon reflexes, but no paralysis. Lumbar puncture brought pus-like fluid with staphylococci on culture. Death February 7, 1915.

At autopsy quantities of pus were found at the base of the brain, especially right. No cerebral abscess. Each of the two poles of the temporal lobes had some yellow plaques the size of a two franc piece, of traumatic origin. No thrombophlebitis. At the base of the skull the left petrous showed a doubtful line of fracture where the dura mater was a little more strongly fixed.

Both auditory apparatus were prepared and sectioned parallel to the posterior (cerebellar) surface of the petrous for microscopic examination. Findings are described very minutely and include the following:

On the left side the tympanic cavity was entirely filled with pus cells, fibrin and a finely granular mass coloring strongly with eosin. The mucosa was thickened and its vessels dilated. Tympanic membrane intact. The lesions indicated an otitis media without perforation. In the wall of the labyrinth and in the promontory was a fracture which had detached a part of the promontory from the labyrinth. The fracture continued between the round and oval windows, and gave communication between the middle and internal ear. In the cavities of the labyrinth were granular masses of pus and fibrin. Pus had infiltrated the ramifications of the auditory nerve throughout its course, and all the findings indicated that it was by this route that the infection reached the meninges.

The following deductions are offered:

Every case of fracture of the cranial base should be examined by an aurist, and under no pretext should the ear or nose be irrigated.

In every case of meningitis following traumatism, when the origin of the infection is not shown by autopsy, both auditory apparatus should be examined histologically.

Fracture of the petrous into the cranial cavity has no great importance in the cause of delayed meningitis. The infection ordinarily follows the same path as in meningitis consecutive to labyrinthitis.

It is not advisable to operate, on principle, for fractures of the petrous. Operation is indicated if there is an accompanying labyrinthitis. A. Miller.

The Enterococcus as a Cause of Serious Endocranial Complication of Otitic Origin.

CALICETI, P., AND VAGLIO, R., Boll. clin., Milano, 1918—XXXV—9.

It is well known that the enterococcus described by Thiercelin may give rise to acute purulent infections of the tympanic cavity and cause severe endocranial complications.

Case 1.—Soldier. Suppuration in right ear. Otoscopic examination showed large perforation of tympanic membrane, abundant otorrhea. Severe pain appeared in the right ear radiating over whole right side of head. Intense pain in the mastoid region. Temperature, 36.9°. March 30th, operation: Under chloroform anesthesia the mastoid antrum was opened. Only two small cells were found filled with pus. These were cleaned out and iodoform gauze used as packing. Next day patient was much excited and suffered from severe headache. Temperature, 39.4° C. Right eye showed slight exophthalmus with edema of eyelids, gradually accentuating conjunctival chemosis, mydriasis and ptosis of upper lid. Death occurred during the night. Postmortem examination showed diffuse hyperemia of dura, right cavernous sinus filled with a thrombic mass, the same condition in inferior petrosal sinus. Bacteriologic examination: Numerous Gram positive diplococci.

Case 2.—A soldier was transferred from a field hospital for suppuration of left ear which, the patient said, had lasted

for two months. He had severe pain in left ear and left side of body. Temperature, 38.4° to 39.4° C.; pulse, 110. Mastoid was red and swollen, very sensitive. In the fibrocartilaginous portion of the auditory canal there were numerous granulations, almost occluding the lumen. Slight nystagmus was present.

Operation under chloroform anesthesia. Radical operation was performed; mastoid antrum was filled with pus, and in the tympanic cavity were numerous fungoid granulations. The mastoid wound was enlarged and wall of lateral sinus exposed. Nothing abnormal was found. Temperature fell from 39.4° to 37.2° C., but rose again next day to 39.4° C., followed by coma and death. Postmortem examination showed small foci of purulent leptomeningitis, left lateral sinus filled with thrombotic mass. Bacteriologic examination: Numerous Gram positive diplococci.

Case 3.—Soldier, twenty-three years old, transferred from a field hospital, had right sided tympanic suppuration, which lasted for the last ten days, severe headache, disturbances of equilibrium, vertigo. Otoscopic examination showed auditory canal ulcerated and covered with abundant granulations, membrana tympani completely destroyed, Romberg symptom and nystagmus, slight mydriasis, intense pain and vomiting were present. Temperature rose to 40.2° C. Operation under chloroform anesthesia. Atticoantrectomy revealed osteomyelitic process of mastoid and attic, and seropurulent masses in mastoid antrum which were curetted. After operation the temperature fell to normal, but soon patient got worse, with vomiting, paralysis of eye muscles, Kernig's sign and death. Postmortem examination showed diffuse leptomeningitis of base and side of brain. Examination of mastoid pus: Numerous diplococci.

Remarks.—From the facts in the case it must be assumed that the germ isolated in the three cases is identical with the enterococcus of Thiercelin. The cultural characteristics are the same as those found by Thiercelin and Rosenthal. The endocranial complications produced by the enterococcus are always of a violent character and are rapidly fatal.

Survey of Head Surgery, Office of Surgeon General, U. S. A., Washington, 1918—I—69.

Thrombophlebitis of the Cavernous Sinus, of Tonsillar Origin.

GOT.

Rev. hebd. de laryngol., etc., Paris, 1917—XXXVIII—313.

A soldier, twenty-two years of age, had a severe left tonsillitis. An abscess developed and opened spontaneously. Notwithstanding this, the temperature remained high; and then set in progressively edema of the corresponding jugular, temporal and parotid regions, exophthalmos, mild delirium, followed shortly by death. No operation. No autopsy. Two similar cases have been reported, one by Lapersonne (recounted by Labolette, thése de Paris, 1891), and one by Tollens. As to the route of infection, Got observes that the pterygoid plexus of veins is in relation with the tonsillar plexus. From the pterygoid plexus infection may be carried to the cavernous sinus (1) by the sphenopalatine vein, as contended by Panas, or (2) by the veins passing through the oval and round foramina. Got thinks the latter route is most plausible.

A Case of Total Facial Diplegia.

ROSSI, A.

Policlin., Roma, 1918, sez. prat., XXV—197-202.

The patient was a man of about forty-six years, who after working in a draft at an open window was taken with slight pains in cheeks and head. One morning in endeavoring to put a cigar into his mouth he found he could not hold it straight in the left angle. There was a flow of saliva from the mouth; he was unable to expectorate and talked with difficulty. His people noticed that his face was distorted. Complete left facial paralysis was discovered on examination, and a few days later bilateral facial paralysis. Electrodiagnosis: Facial diplegia of nucleoperipheric origin due to rheumatism. For twelve days the galvanic current was applied with improvement. After three days' rest the treatment was continued. After thirty-five galvanofaradic applications the patient was cured on the right side, but traces of paralysis remained on the left side. Electric treatment was continued and the patient finally completely cured.

A Case of Wound of the Carotid Bulb by Shot, Treated by Ligation of the Common Carotid and End to End Anastomosis of the External and Internal Carotids.

LEFÈVRE.

Presse méd., Paris, 1918—XXVI—287.

The wounds of the carotid bulb, with the exception of those so small as to be controlled by suture or lateral ligation, require triple ligation—i. e., of the common carotid and its two branches. This is dangerous on account of the lack of sufficient blood passing to the brain, so the author worked out, on the cadaver, a method of anastomosing the internal and external carotids, which he afterwards used in a patient who presented a ragged wound of the bulb which could not be sutured. Having ligated the base of the common carotid, the author resected the upper part of the artery and a part of the carotid bulb to the place where the endothelium seemed healthy. The two carotids were still in contact, and it was easy to bring their edges together and suture them with silk threads sterilized in vaseline. It produced, however, an elbow which obstructed the flow of blood somewhat, and probably caused the ischemic paralytic symptoms which followed. They were transitory, however, and in six weeks there was only a marked decrease in the strength of the left side.

Medical Problems of Aviation.

BERNARD, A.

Progrès méd., Paris, 1918—XXIII—166.

In addition to the problems concerned with altitude, there are others, such as those of sight, hearing, neurologic condition, resistance to fatigue, etc. The rôle of the physician in regard to accidents is largely prophylactic—that is, he must select those best adapted for the service, and must watch them carefully during the period of training in order to observe the changes, if any, brought about by rapid alterations in height, temperature, rarefaction of the air, etc.

Selection of Candidates.—No physician can tell whether a soldier will make a good aviator. Time and his work alone will tell that. But certain moral and physical attributes can

be predicated, and these can be determined by the physician.

1. Surgical Examination.—The best age is between eighteen self to circumstances. Before then he lacks judgment; later the body does not stand well the fatigue of flight. Height and weight are of least importance. Every abnormality should be noted—e. g., a hernia, so that it cannot be used as an excuse for leaving the service. Special attention should be paid to the musculature of the abdominal wall, for if these are flaccid, syncope may come on during a rapid maneuver. Applicants with wounds must be judged each for itself. Head injury is a contraindication—such a patient easily becomes fatigued, gets headaches, becomes excited easily and suffers from troubles with equilibrium. Injuries of the body depend on their extent and interference with the respiration.

So far as the limbs are concerned, most of the work is done with the arms and hands. Therefore injuries to the lower limbs are less likely to incapacitate than those of the upper. An artificial leg may do all the work required of it. Injuries of the upper limbs which are not deforming and not too severe may not incapacitate.

2. Medical Examination.—The habits of the applicant should be investigated. Excess of smoking gives dyspnea, palpitation and diplopia. Alcohol gives similar symptoms. and thirty years, for then the individual can best adapt him- A moderate use of alcohol and tobacco after the flight is allowed by an English author, Graeme Anderson. Untreated or improperly treated syphilitics are barred until after an intensive and prolonged treatment. Malaria and epilepsy are contraindications, as are tuberculosis, bronchitis, pleurisy and asthma. Sea sickness is not a contraindication, as it is rarely observed during flight.

Digestive System.—A truss may be worn if the abdominal walls are weak.

Urinary System.—Albuminuria and glycosuria are absolute contraindications.

Respiratory System.—This should be in the most perfect condition on account of rarefaction of the atmosphere at great heights. The applicant should make a complete expiration, then a full inspiration, which he should hold as long as possible. If he cannot hold it forty-five seconds or

more, he must be rejected, as this condition approximates the oxygen content of the air at great heights.

Nervous System.—Instability is indicated by exaggeration of reflexes, tremors, insomnia and excitement. These men are predisposed to aerneurosis.

3. Organs of Special Sense.—(1) Sight. Every aviator should have perfect sight. Glasses are not desired, as they may become displaced or broken. Vision should be normal in both eyes separately and together. Stereoscopic vision, and especially color vision, are important. Night blindness must be looked for in those selected for bombardment at night. Finally, latent hyperopia and strabismus are among the causes of bad landings.

(2) Hearing.—Pilots with deviations of the septum frequently complain of headache on landing. Mouth breathers often have angina. Deafness of either or both ears is cause for rejection. Suppurative otitis media and perforation of the drum are cause for rejection, as the patient frequently suffers from painful auditory trouble due to quick changes in altitude.

(3) Equilibration and Muscle Sense.—These are of the utmost importance, for on them the pilot depends for his sense of position. In a cloud this is lost, the pilot frequently finding himself rising or falling, so it is evidently corrected by the sight. The applicant should be put through the various tests—standing on one foot, with eyes closed; turning rapidly; estimating the weight of different objects of the same size; turning in a chair, and syringing the ear with cold water, watching the nystagmus.

(4) Psychomotor Reactions.—This consists in taking the time required by the applicant to react to a visual, tactile or motor impression, measured by some suitable chronometer. The average reaction to a visual impression is 19/100 second; auditory, 14/100; tactile, 14/100 second. Retarded, respectively, 22/100—45/100; 20/100—39/100; 20/100—39/100 second. These reactions are retarded by fatigue, excesses, sickness or cold. The pilot should not fly before another examination.

(5) Reactions of Emotions.—The aviator should not show increased respiration and pulse, as the physical representation

of an emotional nature. This can be measured by pneumographic or plethysmographic tracings after a pistol shot.

(6) Power of Observation: Attention.—Gamelli has used the mental tests of Rossolimo. From the results of the last three tests a "psychologic profile" can be drawn in the form of graphics showing (a) attention, (b) judgment, reproduction, recognition of colors; (c) capacity for observation; (d) psychomotive reaction to stimuli; (e) resistance to emotional excitations.

Period of Training.—The physician should live among the students and observe them all of the time. Psychophysiologic changes have not been studied because the necessary delicate instruments cannot be used during flight.

The pulse rate increases to 1000 M.; then decreases to 1400, above which height it rapidly increases. During descent, the pulse rate at first increases, then diminishes. The respiration undergoes the same modifications as the pulse, but remains accelerated at high altitudes on account of the lack of oxygen.

Maximum pressure diminishes up to 500 M. Then it increases a little and slowly. In the descent, it diminishes.

Minimum pressure diminishes to 800 M. Higher, it continues to decrease, but more slowly.

Mean pressure diminishes regularly during ascent, and increases during descent.

In mounting, up to 1500 M., all the respiratory cavities become congested. The aviator is relieved by breathing through the mouth and practicing valsalva. At 4000 M. the troubles disappear. On descending, the same phenomena. On landing, deafness more or less prolonged, and sometimes aural bleeding. Complete rest after landing for fifteen to thirty minutes is very beneficial. Rest for a month will cause persistent troubles to disappear.

Most accidents are on landing, and are due to lack of binocular vision, fatigue, fear or illness.

In the center of each camp should be an observation post, from where the doctor can be telephoned the place of the accident, to which an auto can take him at once. He should have a kit containing ordinary bandages, anesthetics and stimulants, also a scissors, knife and fire extinguisher.

II.—NOSE.

Deformity and Obstruction of the Nose.

MARCONDES, CASTILHO.

Brasil méd., Rio de Jan., 1917—220.

The author presented a photograph, taken before the operation, of a woman who had atresia of the aperture of the nose. By means of operation the turbinates were separated from the septum and the nasal deformity corrected with injection of paraffin. J. Szymansk.

Hay Fever Pollen Extracts and Their Standardization.

SCHEPPEGRELL, WILLIAM.

Med. Rec., N. Y., 1918—XCIV—141.

The strength of the pollen extracts should be stated in units to the cubic centimeter, the standard unit in pollen therapy being 0.001 mg. of pollen protein. The most convenient strength is 100 units to the c. c., this being the most practical for both the diagnostic tests and the treatment. For the former, we inject into (not under) the skin, 0.05 c. c. of this strength, containing five units, which is sufficient to produce a well defined reaction in sensitive subjects and without danger of developing anaphylactic disturbances.

The usual doses of pollen extracts range from five to fifty units, which is represented by 0.05 to 0.50 c. c. of this extract. The pollen extract of 100 units to the c. c. therefore simplifies the application of pollen therapy and diagnosis.

Diluents have been recommended when less than 1.00 c. c. is injected, but we have not found this necessary or advisable, and, as it unnecessarily complicates the technic, it should be omitted.

The pollen used for preparing a special extract should belong to a single variety or class. Combinations, except as far as they belong to the same class of pollens, should not be used. Our investigations have shown that there are certain pollens in which the biologic reactions (hay fever) are similar and which can therefore be combined in one preparation.

It is permissible to use any convenient variety of grass

pollen, or a combination of several, for the grass pollens. This group is preferably called: (1) "Gramineæ," as it includes rye, wheat and other varieties which are not popularly recognized as belonging to the grass family.

The four varieties are: "Gramineæ," "Ambrosiaceæ," "Artemisia," and "Chenopodiaceæ."

These four groups are responsible for most of the hay fever in the United States.

The date of manufacture of pollen extracts should be stated. In spite of the utmost care in their preparation, the activity of some of the pollen extracts diminishes materially after the first season. This is observed not only in the diagnostic tests but also in the effects of the treatment.

Emil Mayer.

The Use of the Turbinates and the Septum in the Repair of Injuries and Defects of the Wall of the Nasal Cavity.

HETT, G. S.

Lancet, London, 1917—II—892.

The author uses the middle and inferior turbinates and also the septum nasi to repair damage to the nose due to war injuries. The inferior turbinals especially have proven successful in wounds in the floor of the nose causing perforation through the palate. The writer takes advantage of the fact that adhesion between the septum and turbinates readily form if there is an abrasion of cartilaginous surfaces, and, owing to their vascularity, the vitality of the turbinals is great. In cases of the destruction of the alæ and turbinates, the anterior one-half of the opposite inferior turbinate has been used as a free graft attached anteriorly to the septum and posteriorly to the junction of the nasal floor and outer wall of the nose.

In case of loss of the upper part of the bridge of the nose the middle turbinals are useful in filling up the hole and also in combination with the septum they can be made to form a support for the skin flap which covers over the gap. They have the added advantage that the mucous membrane of their deep side can be left, and thus form a mucous membrane lining as well as a support for the overlying skin flap. A turbinate

may be first semidetached and its posterior end made to form a new attachment, and subsequently its anterior end may be cut free and advanced to a new position. This was found useful in a case of destruction of the whole nose with great loss of tissue due to destruction of the nasal process of the superior maxilla. In a case of perforating wound of the nose in which the external wound had closed there was depression of the bridge with undue prominence of the tip with nasal obstruction. Here a submucous resection was performed, and the cartilage removed was inserted beneath the skin to correct the depression. Heterogeneous septal grafts when the soft tissues of the septum remain intact are spoken of as a possibility, but no cases are cited. For bringing up the prominence of the bridge two other methods are described. This is the method of the septal swing either upward, downward or laterally.

In the case of the upward swing the septum is cut backward along the floor at the junction of the maxillary crest. The cut is then continued upward toward the roof of the nose, and the septal flap, including cartilage and mucous membrane, is swung forward, remaining attached by a pedicle above. It is retained in position by advancing the two turbinals so that a pent house supports the partition. This is useful for producing a prominence due to loss of tissue of the upper part of the bridge. The reverse of this is done for the lower septal swing and is useful in pug nose.

Ira Frank.

Mycosis Fungoides.

VERCO, Jos. C.

Med. J. Australia, Sydney, April 20, 1918.

A man aged forty-five years had the right upper maxilla removed for a growth which filled up the cavity of the antrum and extended through its outer and posterior walls and through the alveolus. Histologist reported it a round celled sarcoma, although he reported at the same time that its structure was not typical of sarcoma. Later an eruption appeared on the body, which was diagnosed as mycosis fungoides. Four months after the jaw operation a large mass

was removed from the foot. Histologic appearance was identical with the jaw tumor. The growth on the foot was without question a typical case of mycosis fungoides. Eruption and growths appeared on various parts of the body, all typical of mycosis fungoides. The man died after two years. No recurrence of growth in jaw took place. The case is regarded as one of mycosis fungoides, having its primary site in the antrum of Highmore. A. J. Brady.

Nasal Reconstruction.

AYMARD, J. L.

Lancet, London, 1917—II—888.

Although methods for reproducing the nose have been fully described in textbooks, the causes for failure are rarely dealt with, and details of the work are sadly deficient. Almost the greatest difficulty presenting itself is the fact that when the nose has been destroyed by injury the new flap has to be implanted on scar tissue. Probably the most common cause of failure is the fact that the nasal cavity is not ideally aseptic at any time. The flap should be taken from the site likely to lead to the least ultimate disfigurement. The lining of the flap should be something else than scar tissue. The new organ should as much as possible conform to the old one. The supporting framework should simulate the original. The bed area for the new nose should be most carefully prepared.

As to the skin flap, Aymard is trying a new method, taking a long pedicle flap with its base near one clavicle, and forming the nose on the chest, keeping the head bent slightly for fourteen days. The hope is to save time as compared with the forehead flap. If it fails, Aymard will go back to the older method of taking a small flap from the forehead and alar flaps from the cheek. He favors cartilage for the supporting framework, taking it from the eighth costal. This forms the anterior framework of the nose and may be supported laterally either by turning up the turbinates (Hett) or by turning down a skin flap. He also favors swinging a portion of the septum forward for a support.

Great care must be given to preparation of the skin area

upon which the new nose is to be embedded, and it is advisable to undercut the skin and tissues in order to contract the opening and bring new healthy tissues into the region. Reformation of the lip is frequently necessary.

He gives photographs showing the remarkable result of nature's plastic surgery; in the first photograph the nose and upper lip seem to be almost completely destroyed; in the second restoration seems wellnigh complete, save for a small hiatus at the nasal tip; here the only treatment was a paraffin dressing.

Initial Syphilis of the Nasal Fossae.

BASILE, G.

Policlin., Roma, 1918, sez. prat., XXV—510-514.

Primary syphilitic lesions of the nasal fossæ are rare, yet Munchheimer found such lesions in 4 per cent and Vignolo-Lutati in 5 per cent of all cases of extragenital chancers.

Case 1.—Girl, twelve years old. First noticed a slight catarrh, which increased in severity. Soon there appeared obstruction to breathing, mucopurulent secretion, weakness, anemia and occasional headache. Examination of left nasal fossa showed a tumor on the anteroinferior portion of the nasal septum. There was no pain. The lymphatic gland at the left angle of mandible was enlarged. The tumor was removed with the cold snare. Slight hemorrhage. Bacteriologic examination showed spirochetæ. Treatment: Antisyphilitic.

Case 2.—Man of thirty years. First had neuralgic pains on left side of head. At the same time there were intense coryza in left naris, producing in a few days complete occlusion, abundant serous secretion and fever. Examination of left nasal fossa showed swelling with erosions on the inferior turbinate. In the mental region a few lymphatic glands enlarged. Diagnosis: Syphilis.

Primary syphilitic lesions of the nasal fossæ may assume three forms: (1) A tumorlike growth, as in the first case; (2) an erosive diphtheroid form, as in the second case; (3) an impetiginoid form, which is very rare and difficult to diagnosticate. Fournier has described these three forms as

the most common. An important diagnostic point is the finding of enlarged lymphatic glands in the submaxillary region. The seat of the chancer is almost always on the external wall of the nasal fossa.

III.—PHARYNX AND MOUTH.

Three Cases of Adenoids With Hypophyseal Feminism.

CITELLI, S., AND CALICETI, P.

Policlinico, Roma, 1918, sez. prat., XXV—245-250.

Case 1.—Soldier, twenty-five years old. Intellectually deficient, with marked hypotrichosis. There were traces of gynecomastia; pelvis was very large; the patient presented typical signs of adenoids (facies adenoidea), but none were found. Injection of endohypophysin (whole gland) caused a rise of temperature and headache, and was without any success.

Case 2.—Soldier, twenty-two years old, with diminished intellectuality; mouth always open; forgets easily; some adenoids still present; hypotrichosis; pelvis large. Injection of endohypophysin was followed by no improvement, but with rise of temperature.

Case 3.—Corporal, twenty-one years old. Was always markedly forgetful in school. Sexual powers very weak; adenoid facies; hypotrichosis. Injection of hypophysin caused rise of temperature. The rise of temperature after injection of pituitary extract in these three cases suggests the hypophyseal nature of this symptom complex.

Vincent's Disease of Mouth and Pharynx.

MCKINSTRY, W. H.

Practitioner, Lond., 1917—XCIX—507.

The writer makes an extensive report. He examined microscopically smears from 1,320 healthy soldiers and found fusospirochetal organisms in 32. He found in 230 healthy recruits 95 positives. He made smears from ulcerations; dried, fixed and stained them in dilute carbol fuchsin for a

few minutes; then dried and examined under oil emersion. In every case almost pure culture of fusiform and the spirochete were found. The pathologic changes are most frequently found after some erosion of gums or tonsils. The lesion may be found on gums, tonsils, cheek, palate or pillars of fauces. It is usually covered by thick, soft, creamy membrane which can be easily removed. The ulcer may be irregular or punched out and has a very angry look. Another form resembles depth in that the membrane clings to the surface and when removed bleeding takes place. The gums are attacked three times as frequently as tonsils. The frequent site is about the teeth and has been named "peridental ulcerative gingivitis." Pain, bleeding, foul breath and bad taste in the morning are usually complained of. As a rule there is no constitutional disturbance. Temperature is usually normal. Cases may be very acute, but many are chronic. The socalled "trench gum" is found to be typical of this disease. Under treatment most acute cases are well by three weeks. The chronic cases are liable to be refractory. In treatment all teeth should be cleaned of tartar. The teeth should be cleansed t. i. d. with soft brush and peroxid or chlorate of potash. He has found that alkalin salvarsan solution, twice venous injection strength, applied to lesions every day until cultures are negative gives best results. Usually ulceration of mouth and tonsils are relieved by same treatment as that applied to gums. E. R. Holmes.

A Few Notes on the Treatment of Gunshot Wounds of the Mandible and Maxilla.

FRY, W. K.

Lancet, Lond., 1917--CXCIII—852.

Fracture of the Mandible.—As soon as possible skiagrams are taken to demonstrate the situation and extent of the injury to the bone. For this purpose an anteroposterior in addition to a right or left special view is always taken. If a fracture of the coronoid process or neck of the condyle is suspected it is best to take the skiagram with the mouth open. When a fracture is present in the regions of the horizontal and ascending rami a lateral view is always necessary. It is

very important to repeat these lateral views at intervals of a month to six weeks, in exactly the same position, to detect any change in position of fragments and note progress.

The skiagram shows: (1) Teeth involved or likely to become involved; (2) the amount of bone lost; (3) type of displacement; (4) presence of foreign bodies, metal fragments or displaced teeth.

Treatment.—When the wound is very septic, free extraction of the teeth is the rule. Any tooth which is in the line of fracture or likely to become involved by absorption of bone is removed. It is important to preserve a tooth on the posterior fragment, even temporarily, for splinting purposes. At the time of extraction of the teeth free drainage is always established. A piece of rubber tubing is placed between the ends of the bone and brought into the submaxillary or submental region of the neck. The drainage tubes are left in from fourteen to twenty days, being gradually withdrawn after seven days. No bone is removed at the time of operation except that which is very loose and obviously necrotic. Impressions are now taken for making the splints. While the splints are being made the broken fragments of the mandible are put to rest by ligaturing the teeth to the maxilla with grass line and brass ligature wire. At this stage a case is classified into one of three groups: (1) Those cases which should get primary bony union in normal occlusion; (2) those in which primary bony union is doubtful; (3) those in which it is certain no useful primary union can be got on account of too great a loss of bone.

Class 1.—These cases are splinted into normal occlusion. Upper and lower capped splints are used. Class 2—These cases are given every chance of primary union. In fracture of the angle the fragment must be swung over to help to fill up the gap. In middle line fractures the fragments must be approximated. In these positions the jaws must be splinted for a varying period and repeated skiagrams taken. If large pieces of bone have exfoliated and no chance of union is observed, the case is treated as in Class 3. In this class the treatment consists in holding the fragments in good position with as little strain as possible on the teeth, until bone graft operation is advisable. Early operation by wiring, plating,

etc., has proved useless. Reference is made to cases of fracture of the symphysis with comminuation where, after three months' splinting, an apparent bony union has been attained. A slight springiness, however, shows it to be only callous. If the splint is then removed the patient will gradually bite the fragments apart.

Fracture of the Maxilla.—There is only one class of these cases, and they are treated with success in the following way: (1) Free extraction of septic teeth and teeth involved in fractured area. (2) Early suturing of soft parts. (3) Good drainage. (4) Leaving all loose bone to exfoliate itself. (5) Supporting the maxilla with a perforated vulcanite "Kingsley" splint. The splint is held up by elastics to a head net or plaster of Paris bandage around the head. In bad fractures high up we are warned not to press up too much, lest the optic nerve be pressed upon. Plates and photographs illustrate the paper. A. J. Brady.

The Menace of Mouth Infections.

OSBORNE, OLIVER T.

J. Am. M. Ass., Chicago, 1917—LXX—1313.

The writer's belief is that there is no greater menace to health today than crowned and bridged teeth, to say nothing of imperfectly filled and dead teeth and of pyorrhea alveolaris. Furthermore, infections of the tonsils and sinuses adjacent to the nose must never be overlooked. If such infection has not caused symptoms it will do so, and its eradication is the only safety. He reviews the usual focal infection lesions of the cardiovascular apparatus and the joints, and emphasizes the possible relation of mouth infection and chronic colitis which occurs so frequently after forty years of age. He makes a plea for better cooperation between the dentist and the physician to determine what teeth shall be preserved, what teeth removed and how best to treat the gums; also what part a diseased condition of the patient plays in a mouth infection. He further claims that no dentist should devitalize or attempt to fill the roots of devitalized teeth which are to be preserved without the aid of radiograms; that every case of pyorrhea alveolaris, every suspicious root and occasionally

all crowned and bridged teeth should be subjected to the scrutiny offered by the X-ray. Physicians should study the mouths of their patients more. He condemns the too prevalent and promiscuous use of iodin on the gums by the dentist. A review of the effects of mouth infection on the internal secretory organs of the body is given. The author summarizes his conclusions as follows: Most unexpected tolerance to pyorrhea alveolaris and to tooth infection is found. Chronic invalidism may be caused by mouth infection. Blood pressure may be raised or lowered, the thyroid gland is frequently enlarged, hypo- or hypersecreting, and serious disturbances of the blood, heart, kidneys, stomach, intestines and joints are frequent from these mouth infections. Glycosuria, serious distant focal infections and brain and nerve disturbances may occur from mouth infection. Ulcer of the stomach, pyelitis, appendicitis, chronic colitis, pneumonia, etc., may be caused by the presence of pyorrhea alveolaris and mouth infection. No treatment of all these conditions will be of avail until the mouth is made clean.

Stock or autogenous vaccines are not very promising in a therapeutic way, but in obstinate cases they should be tried.

One should not promise too much as to the cure of focal infections by the eradication of the foci in the mouth, throat and nose. Their eradication does produce brilliant cures, but does not remove the germ localized in a distant part of the body and will not restore degenerated tissues. Any fresh lesion of the mucous membranes of the mouth is a source of danger and the mucous membranes of the mouth should not be blistered by iodin or other escharotics.

Jos. D. Heitger.

A Serologic Investigation of Vincent's Angina.

TAYLOR, FRANK E., AND MCKINSTRY, W. H.

Brit. M. J., Lond., 1918—I—82.

The writers state that the Wassermann reaction is positive in syphilitic affections of the pharynx but negative in all others, with the exception of the angina of scarlet fever. This opinion, however, which is based on the careful bacteriologic examination of several hundred cases of sore throat at the

Queen Alexandra Military Hospital, is quite at variance with the views expressed in several contributions scattered through the literature of the subject, in which it is maintained that in uncomplicated cases of Vincent's angina the Wassermann reaction is found to be positive. The writers combat this view and state that where a positive Wassermann is found in Vincent's angina syphilis, either latent or active, is also present. At the Queen Alexandra Military Hospital more than three hundred cases of fusospirillary infection were recently examined. About half were typical cases of Vincent's angina (verified). From these, fifty-five cases were taken without selection: in all these cases, with but two exceptions, Wassermann was negative. The history of the two cases where the exception was noted is given. Both had syphilis ten years previously.

As a result of this investigation and a critical consideration of the cases recorded in the literature, the writers have come to the conclusion that the prevailing belief in the occurrence of a positive Wassermann reaction in Vincent's angina has no foundation in fact. When Wassermann is positive in Vincent's angina, then a double infection exists, either as a coincident syphilitis and Vincent's infection or the occurrence of Vincent's angina in a syphilitic subject. A. J. Brady.

Retropharyngeal Abscess.

RUSH, CALVIN C.

J. Am. Med. Ass., Chicago, 1918—LXXI—174.

The source of infection leading to abscesses posterior to the pharynx are usually classified under four headings:

1. Those due to caries of the upper cervical vertebræ, usually of tuberculous origin. Such an abscess, being dorsal to the prevertebral fascia, is very apt to burrow laterally and appear as a tumor in the neck, dorsal to the sternocleidomastoid muscle, where it should be opened under the strictest asepsis to prevent mixed infection. If unopened, it may follow the brachial plexus into the axilla. Regardless of the prevertebral fascia, it may, however, burrow forward in the midline of the pharynx.

2. Those due to an otitis media. The pus probably bur-

rows downward in the upper part of the eustachian tube along the tensor tympani muscle, to terminate behind the prevertebral fascia. It tends to point in the same direction as infection from cervical vertebral caries.

3. Those due to an extension inward of a carotid abscess.

4. Those due to infection of the lymph nodes of the retropharyngeal space. These nodes are one or two in number on either side of the midline opposite the lateral masses of the atlas. They receive lymphatics from the nasopharynx, eustachian tubes, nasal fossæ and accessory sinuses.

Abscesses in the pharynx should be opened in the midline, while the baby's head in held sufficiently low to allow the contents to flow out of the mouth. Emil Mayer.

Observations on Throat Smears in Measles, Rubella and Scarlet Fever.

TUNNICLIFF, RUTH.

J. Am. Med. Ass., Chicago, 1918—LXXI—104.

The tonsils or anterior pillars of the fauces, the part most inflamed, is swabbed with a sterile swab, the material smeared rather thickly on a clean glass slide, fixed with heat, stained a few seconds with carbol gentian violet, washed with water and dried. The material may be smeared in serum and stained with some capsule stain, but the carbol gentian violet stains quickly and gives a perfectly clear picture.

As a rule the smear from a measles throat shows a variable number of polymorphonuclear and epithelial cells, and many small, round diplococci about 0.5 micron in length.

A smear from a rubella throat shows few if any leucocytes, but many epithelial cells, containing elongated, pointed cocci in pairs, sometimes in chains, often showing a narrow capsule. The diplococci are also seen outsied the cells, but are especially characteristic when on the epithelial cells.

Smears from scarlet fever throats show many polymorphonuclear leucocytes, and a variable number of cocci, usually round, in pairs, or chains of rarely more than four, with generally a wide capsule.

The three types of diplococci described were not recognized in the thirty normal throats, except four times, when the

rubella coccus was found in persons closely associated with rubella patients. The rubella diplococcus was also observed in three of the eight cases of socalled simple sore throat, two in roommates and one in a nurse of rubella patients. These smears were made during an epidemic of rubella, and doubtless the other diplococci can be found in smears of normal throats during epidemics of measles and scarlet fever.

There is rarely much difficulty in making a diagnosis of measles, but at times it is not easy to differentiate a mild case of scarlet fever from rubella. In the Durand Hospital throat smears are proving helpful in differentiating these two diseases, especially in conjunction with leucocyte counts, as the number of leucocytes is increased in scarlet fever and reduced in rubella. Émil Mayer.

Note on the Technic of Tonsillectomy.

BIGO.

Rev. hebd. de laryngol., etc., Paris, 1917—XXXVIII—339.

The author regards ablation by the electrocautery snare as the only method that should be employed. Total tonsillectomy he thinks unnecessary and believes that the object of the operation is attained by cutting off the overdeveloped portions of the tonsil which interfere with deglutition and respiration.

A. Miller.

Fractures of the Lower Jaw.

IMBERT, L., AND RÉAL, PIERRE.

Rev. de chir., Paris, 1917—LIII—304.

War has brought the question of injury to the lower jaw and its treatment into great prominence. Following Claude Martin, the attempt has always been made to reestablish the apposition of the preserved teeth by a pseudoarthrosis. Three cases are reported where the author treated the cases by immobilization of the jaw in occlusion, in the beginning respecting the anomalous relation of the alveoli. Then, as the consolidation proceeded, the normal relations were gradually reestablished either by adjusting the apparatus of the author or by making use of intermaxillary elastic force. His conclusions are:

1. The anterior projection of the posterior fragment is a natural movement.

2. This displacement permits the coaptation of the fractured surfaces and thus facilitates consolidation.

3. The mandibular deformity which results is less to be feared, since it is perfectly compatible with almost complete integrity of mastication. This is probably due to the great adaptation of the temporomaxillary articulation.

Facts and Fancies About Tonsils.

SWAIN, HENRY L.

Med. Rec., N. Y., 1918—XCIII—1069.

In spite of every care, the luck of war will go against us, and a little one slips away from us into the other world—no oftener than the usual operative risk, but one would like to feel sure of the necessity of taking these risks which are not in the least exaggerated. In view of these, there ought to be some more exact method of deciding whether to operate or not, than merely to say inanely that we cannot find anything else to lay it to, so let us get the tonsils out.

If the tonsils are removed before the period of physiologic activity of the adenoid or third tonsil has passed, the adenoid will grow and have the same passive and functional hypertrophy of which we have spoken in the case of the faucial tonsils. The system needs it in some way, and so functional activity develops it anew.

If a tonsil is diseased it is a menace; if it is healthy, it is not. Every faucial tonsil has crypts, every crypt in every human being has a fluid filling it, especially when it is deep set, as in every large tonsil, whether healthy or unhealthy. Large protruding tonsils often are much healthier than small buried ones. These tubular cavities filled with an organic fluid contained in a warm, moist chamber are always growing a numerous and diversified flora. There could not be conceived a better breeding ground; a better culture tube and incubator for germ growth never existed. Hence in every tonsil, healthy or otherwise, pure cultures of pathogenic germs may exist, but more frequently a symbiosis of numerous germs will be present. In the living human being there can

never be for more than a moment or two a sterile tonsil crypt. crypt.

Some tonsils protect, some put up a very minimum resistance, some lie inanely down, while some actually seem to harbor disease, sedition and rebellion, and aid and abet the enemy.

Inasmuch as many tonsils require removal, when this is necessary there is no way as good nor anywhere nearly as satisfactory from every standpoint as tonsillectomy.

The writer proves the necessity for graver procedures by first trying the more conservative. By this latter he often succeeds, and this is only fair to infirm or delicate or timid folks, to do the easiest way for them. They have a right not to be dragged through the more serious ordeal when unnecessary.

In children, especially under six or eight, one should be just as thorough as is possible—if necessary reoperating, in order to get rid of all adenoid or third tonsil. Unless very large or the cause of much trouble, the faucials are allowed to remain. When the child is under the anesthetic, some operators always remove the tonsils when operating for adenoids. By simply seeing that the plica is freed from the tonsil and the tonsil from adhesion to the pillar, small unsuspected tonsils can certainly quite safely be allowed to remain and do some good to the growing child.

Every tonsil worthy of the name will at some time have thick white cheesy matter in its crypts, large ones almost always. This will almost always squeeze out when the tonsil is snared out in operation. Quite generally it appears when a tonsil is squeezed by a spud or by the edge of a tongue depressor. To accept this as the criterion for operation means that you must remove every tonsil, for, as we have just said, this probably happens at some time to every tonsil. The partitions between them will remove this tendency to accumulate and, therefore, one indication for tonsillectomy. If accumulation continues remove, but to say that because once or twice a year a simple sore throat occurs, or a bit of accumulation is found that often, is not to my mind a logical indication for removal in toto.

It would seem only fair to think that we all ought to remem-

ber and explain to our patients that too much must not be promised or expected as a result of the tonsillar operation, for otherwise we greatly mar the splendid work done in our own circle and elsewhere to perfect the operation of tonsillectomy, doing thereby a great injustice.

Finally, would it not be a most beneficent action if by any chance some of this effort which the world over has been spent on the mere mechanical aspects of removal of the tonsil could be diverted to studying the broader question: whence come the germs which get into noses and throats and make all this trouble. They come from some given source, to be sure, perpetuated by carriers of the human variety, but is it too utopian to expect that some of the tireless workers in the laboratories may discover just this source of trouble, and as was the case with malarial parasites, also a means to prevent their growth and spread? Emil Mayer.

Diphtheria and Diphtheria Carriers in Army Camps, as Studied at Camp Sherman, Ohio.

McCord, Carey P., Friedlander, Alfred, and Walker, Robert C.

J. Am. M. Ass., Chicago, 1918—LXXI—275.

It appears established that the fundamental of carrier treatment is the placing of such carriers in the hands of competent throat specialists. The use of any materials, however efficacious, will not remove the organisms except on the surface of the tonsils and throat. The application of materials is only infrequently made to include the nasopharynx, and even less frequently to penetrate into the crypts of the tonsils, adenoids and perieustachian tissues. The required number of negative cultures may be obtained after the use of many antiseptic materials, only to have the organisms reappear through extension from a retained focus deep in some crypt. Cultures from the interior of excised tonsils of diphtheria carriers repeatedly have exhibited viable diphtheria bacilli when surface cultures indicated an absence of such organisms. Diphtheria carriers should be referred as a routine to a medical officer of the throat department, who will make examinations for and treat any ulcers or crypts in the tonsillar or adenoid

tissues. In case the tonsils are badly involved, tonsillectomy is the procedure of choice, and should early be resorted to. When the general pathologic condition of the throat is adequately cared for, the state of being a carrier of diphtheria may be expected to clear up under treatment with various of the above-named methods.

Beginning at approximately February 1, an effort was made to standardize the treatment of all diphtheria carriers. The administration of antitoxin to carriers was discontinued as ill advised. Medical treatment then in vogue was discontinued as unsatisfactory. Treatment was especially directed to the elimination of existing open throat lesions. Tonsillectomy was carried out in a number of cases with a quick termination of harboring diphtheria organisms in all cases. In addition, a systematic treatment with chloramin-T (chlorazene) was inaugurated. This use of chlorazene in the treatment of diphtheria carriers was anticipated by Dunham and Dakin without, however, being used in any actual diphtheria carrier cases. Its application, as we have employed it, consists in the use of an aqueous solution of 0.25 per cent strength, administered as a gargle three or four times daily. In certain cases the application was made by throat specialists to insure the reaching of remote points in the nasopharynx. The gargling was followed with an oil spray of dichloramin-T of two per cent strength. It may not be maintained that the chloramin action is exclusively responsible for the appreciable reduction of days in hospital of carriers. This is in part due to the chlorazene-dichloramin-T treatment and in part to the general painstaking systematizing of the entire care of such patients. Through the use of these several described procedures, it has been possible to return the carriers to duty after an average of twenty-three days in hospital. During the month of May the systematizing of treatment made it possible to discharge all diphtheria patients (sixteen in number) after fifteen days in hospital, and all carriers (twenty-nine in number) after sixteen days in hospital.

The authors conclude:

1. With reasonable precautions, diphtheria is unlikely to become, a serious menace to the health of army camps.

2. During the five months covered by this report, sixty-

three cases of clinical diphtheria occurred, with no deaths; 3,215 exposed persons were examined, eighty-nine of whom proved to be carriers; the number of carriers detected is 2.76 per cent of the number of exposed persons examined.

3. The employment of the system for the care and treatment of diphtheria carriers described in the foregoing has reduced the average stay in hospital for convalescent carriers from fifty-five days in the first month of this report to fifteen days in the last month of the report, with an average for the four months of twenty-three days. The period in hospital for contact carriers has been reduced to sixteen days for the last month of the report, with an average of twenty-three days for four four months.

4. The procedures described have greatly facilitated the early return of diphtheria patients and diphtheria carriers to their organization, physically fit for duties and training.

Emil Mayer.

Two Cases of Suppurative Paranephritis of Tonsillar Origin.

BOTTESELLE, R.

Riforma méd., Napoli, 1918—XXXIV—44-48.

Case 1.—Woman, twenty-three years old, was taken with pain in right lumbar region, general weakness, headache, loss of appetite and chills. Temperature varied, sometimes reaching 40° C. An abscess on the middle finger of the left hand of the size of a hazelnut was opened and readily healed. A few days later another small abscess formed below the right nipple and was soon cured after incision.

Diagnosis: Right paranephritis. Examination: Slight enlargement of cervical axillary and inguinal glands; tonsils hypertrophied and of reddish color; palpation showed an ovoid swelling in region of right kidney. Examination of blood: Red cells, 4,600,000; leucocytes, 12,000; polynuclear neutrophiles, 82 per cent. Urine amber yellow; urea, 11.50 per cent; albumin, 15 per cent. Diagnosis: Purulent paranephritis on right side. Operation: Posterior surface of kidney was free, kidney not enlarged, abscess found anterior, close to the hilum. Incision relieved about 100 cubic centi-

meters of pus. Bacteriologic examination showed streptococcus pyogenes. Patient recovered.

Case 2.—Girl of eighteen years. One morning on rising from bed felt violent pain on the left side with chilliness, then fever. Pain increased, fever reached 40° C. Examination: Tonsils were hypertrophied, crypts being filled with detritus. Right renal region was very sensitive to touch. Radiograph showed diffuse shadow in the right renal region. Blood: Hemoglobin, 85 per cent; leucocytes, 14,000; polynuclear cells, 80 per cent. Diagnosis: Suppurative paranephritis on right side. Operation: A large abscess on the posterior surface of the kidney was incised. Bacteriologic examination showed staphylococcus pyogenes aureus. Patient recovered.

What was the starting point of the microorganisms in these two cases? The tonsils, by their anatomic structure, are a common portal of ingress for microorganisms. As the germs in these cases were not specific they must have found their way from the tonsils to the kidney through the circulation. The first patient had a short acute tonsillitis two months before the trouble appeared. In both cases chronic hypertrophy of the tonsils was present. In neither of the two cases could a previous cutaneous lesion be ascertained.

The Buccopharyngeal Manifestations of Typhoid Fever.

BERGOLLI, F.

Riforma méd., Napoli, 1918—XXXIV—264-267.

The first to describe typhoid ulceration of the throat was Bouveret in 1876, but it was little known until much later. There are five forms of buccopharyngeal changes in typhoid:

1. A simple redness with a certain edema of the pharynx, sometimes accompanied by swelling of the tonsils, which occurs frequently at the beginning of the disease. It is most frequently met with during the winter season.

2. In typhoid fever, especially if the case is serious, the tongue and the lips become dry and are covered by a crusty layer. There is sometimes also a severe inflammation of the soft palate and pharynx, characterized by an extreme dryness. This form may be called the crustomucous form. It is almost exclusively under these conditions that the pseudomembranous

anginas develop. The agent may be the diplococcus of Fraenkel or the streptococcus. In case of the streptococcus the condition is accompanied by an abundant mucous secretion. The association of diphtheria with typhoid was mentioned by Joltrain in 1915.

3. A third form of changes in the throat during typhoid consists in miliariform vesicles which appear on the hard and soft palate. They are only noticed if the mouth is well lighted up by an electric lamp. They are not surrounded by inflammatory areas and are not painful.

4. A fourth form is the true angina of Duguet. It is not frequent. It consists in one or multiple ulcerations, generally localized on the upper portion of the anterior surface of the anterior pillars and on the uvula, rarely on the posterior pillars. The ulcer is superficial, ovoid, with a red border, a grayish base, without a false membrane.

5. The last form comprises those rare cases in which we observe, especially on the hard palate, punctate or lenticular spots of an intense red color, which disappear on pressure and somewhat simulate roseola.

These conditions were found 108 times in 400 cases. Bacteriologically 40 cases belonged to the typhus bacillus, 16 to paratyphus B., 9 to paratyphus A., and in 43 cases the germ could not be ascertained.

Hemorrhage From Tonsillectomy.

AIEVOLI, E.

Riforma méd., Napoli, 1918—XXXIV—327.

Statistics show that hemorrhage after tonsillectomy is not frequent. Wright noted, from 1868 to 1890, among 3,000 cases only one case of serious hemorrhage, and in the succeeding years he saw 54 cases, one of which was fatal. Browne had among 50,000 cases only four or five cases of grave hemorrhage.

As the tonsillar region is traversed by important vessels (facial, lingual, internal maxillary arteries), it is quite possible that hemorrhage may be due to abnormalities of the blood vessels—i. e. (1) of the tonsillar artery and its branches; (2) of the ascending pharyngeal, (3) of a branch of the de-

scending palatine, (4) of a branch of the ascending palatine, (5) of a branch of the dorsal artery of the tongue found in the lower part of the tonsil and external pillar, (6) of capillary branches of the anterior and posterior pillars, (7) of an enlarged venous plexus on the inferior external border of the tonsillar crypt, (8) of the internal carotid.

Predisposing causes are acute tonsillar inflammation, anemia and leukemia, cardiac and renal disease, menstrual and pregnant stage, adult stage, male sex, hemophilia and purpura, fibroid state of tonsil, arterioles losing contractility, malignant growth and anomalous course of blood vessels.

From these causes it is clear that the cases for tonsillectomy should be carefully selected. Some writers have used prophylactic means: adrenalin, injection of hypophyseal extract, serotherapy. But a prophylactic measure is also the operative method selected. Short anesthesia with ethyl chlorid has been advised. A successful method is the removal of the tonsil by the hemostatic guillotine, an instrument much improved by Willis, Ballenger, Howard and others. But in spite of these various methods, cases of hemorrhage will occur. In such cases Moore advises hypodermic injection of morphin and atropin. Calcium lactate and calcium chlorid are used per os and per rectum. Adrenalin is good at first, but predisposes to secondary hemorrhage. Pituitrin is of great value. Hypodermoclysis and phleboclysis have also been used.

A Case of Ludwig's Angina.

BLASI, G.

Policlin., Roma, 1918, sez. prat., XXV—134.

Boy, ten years old, with dental caries. An attack of toothache was followed by high fever and swelling under the chin, which spread to the neck and cheeks. Delirium was present at night, also insomnia; respiration was accelerated; there was almost complete aphonia, as well as dysphagia. Examination: Floor of mouth bulging. Outside pressure under chin caused pus to exude from a premolar tooth cavity. The pus must have found a way through the body of the mandible, through

the pervious root canal and through the carious dental cavity. Diagnosis of sublingual abscess being made, the abscess was opened by a large transverse incision under the chin. The pus was evacuated, antiseptic irrigation used, drain inserted. On next day the swelling had greatly subsided on the right side, but increased on left side. A second incision was made, extending the first one to the left, following the border of the maxilla. Congested and swollen submaxillary glands were exposed. A sound was passed behind the gland to the parotid region. Patient recovered.

Dark Field Study of Five Cases of Pseudomembranous Oral Infection Diagnosed Clinically as Vincent's Angina, at Base Hospital, Fort Dodge, Iowa.

BRUMBAUGH, ARTHUR S.

Survey of Head Surgery, Office of Surgeon General, U. S. A., Washington, 1918—I—45.

Case 1.—White, age twenty-two years. Soreness of the mouth dates from the extraction of a molar tooth one month ago; dysphagia but no pain; smokes considerably but teeth are sound and clean. The lesions consist of several grayish white patches on the right tonsil and a large patch of similar color involving the right side of the soft palate, extending to the gum of the upper jaw and the cheek, having a sharply defined margin and a narrow reddish zone of hyperemia around it. The base of the ulcer bleeds readily when the membrane is scraped off. The lymph nodes at the angle of the jaw on both sides are enlarged, especially on the right. The axillary and inguinal glands are moderately enlarged and easily palpable. A pigmented scar is found on the shaft of the penis. The patient claims it was caused by chancroid one year ago. His skin is clear of eruption.

Wassermann Test.—Negative.

Throat Smear.—Stained preparations showed the presence of the spirochetes and fusiform bacilli characteristic of Vincent's angina. Dark field examination of secretion from the lesions revealed the presence of enormous numbers of motile

fusiform bacilli and coarse coiled spiral organisms, both forms being very active and darting across the microscopic field so rapidly that their morphology could be distinguished only when they are slowed up at clumps of cells or débris in the preparation.

Diagnosis of Ward Surgeon.—Vincent's angina.

Dark Field Diagnosis.—Vincent's angina.

Case 2.—White, aged twenty-three years. His sore throat is of three weeks' duration. Pharynx and palate are granular and red, and scattered patches of grayish exudate are present on the postpharyngeal wall and right tonsil. The gum about the two posterior lower right molars is reddish, swollen, projecting above the teeth and covered with grayish membrane. The lymph nodes at the angle of the jaw are moderately enlarged; the inguinal and axillaries are also readily palpable. Patient denies venereal infection. There are no scars on the genitalia and the skin is clear. He smokes tobacco rather immoderately. The teeth are clean and free from caries.

Wassermann Test.—Negative.

Throat Smear.—Stained preparation shows the presence of Vincent's organisms.

Dark field examination reveals very numerous coarse coiled spirochetes and a few fusiform bacilli, both forms very motile.

Diagnosis of Ward Surgeon—1. Tonsillitis, acute follicular. 2. Vincent's angina, right tonsil, moderately severe.

Dark Field Diagnosis.—Vincent's angina.

Case 3.—White, age twenty-three years. His sore throat is of ten months' duration. Lesions consist of a granular ulceration of the soft palate, having a reddish base, with scattered irregular areas of grayish pseudomembrane. He smokes moderately and his teeth are good and clean.

Throat Culture.—Showed bacillus diphtheriæ absent; a few hemolytic streptococci present.

Throat Smear.—Stained preparation three months previously showed Vincent's angina organisms. Two weeks ago none was present.

Wassermann tests, made respectively two months ago and three months ago and at the present time, are all negative.

Dark field examination revealed rapidly motile fusiform bacilli and coarse coiled spirochetes.

Diagnosis of Ward Surgeon.—Vincent's angina, severe, involving the fauces and soft palate.

Dark Field Diagnosis.—Vincent's angina.

Case 4.—White, age thirty-one years. His sore throat began six weeks ago. Both tonsils and soft palate are covered with a grayish white membrane, marked off with a narrow hyperemic zone. The lymphatics at the angle of the jaw and the postcervical chains are enlarged. The inguinal lymphatics are slightly enlarged. The patient is obese, weighing two hundred and five pounds. He has several scars on the penis, which he attributes to soft chancres six weeks ago. His skin is clear. He complains of rheumatism of the ankles. He smokes very rarely. His teeth are clean and free from caries.

Throat culture showed hemolytic streptococci.

Throat Smear.—Stained preparation showed presence of Vincent's angina organisms, Gram positive diplococci and diphtheroid bacilli.

Wassermann test, made recently, was negative.

Dark field examination reveals the presence of a very few typical treponema pallida and a few Vincent's organisms.

Diagnosis of Ward Surgeon.—Vincent's angina.

Dark Field Diagnosis.—Secondary syphilis.

Case 5.—White, age twenty-two years. His sore throat is of six months' duration. He smokes considerably. His teeth are slightly tobacco stained and he has two carious molars. Otherwise his teeth are in good condition. The lesions consist of grayish white patches on the soft and hard palate, the lateral and inferior surface of the tongue and on the lower lip. They have smooth serpiginous margins and a very narrow zone of hyperemia about the palate lesion, but none around the tongue and lip lesions. The membrane is tightly adherent and does not bleed readily if the surface is rubbed. He denies venereal infection and the skin of the body is free from eruptions. The glands at the angle of the jaw are markedly enlarged. The axillaries and inguinals are also moderately enlarged. The genitalia are free from scars.

Throat culture one week previously showed bacillus diphtheriæ absent.

Throat Smear.—Stained preparation showed Vincent's angina organisms present.

Wassermann test one week previously was mildly positive.

Dark field examination revealed a few typical treponema pallida.

Diagnosis of Ward Surgeon.—Acute catarrhal pharyngitis and Vincent's angina.

Dark Field Diagnosis.—Secondary syphilis.

COMMENT.

The differential diagnosis of these cases clinically and by the usual laboratory procedure, without dark field, presents many difficulties and may be impossible. The lesions of true Vincent's angina and secondary syphilis are quite similar, the pseudomembrane has the same grayish white appearance and the location and appearance of the lesion and glandular enlargement are by no means characteristic. Even the Wassermann test may be misleading, as in case four, which gave a negative Wassermann test, yet the lesions contained the treponema pallidum. In case five, the mild positive Wassermann test still left the case in doubt as to whether it may not have been a case of Vincent's angina developing in a mild or chronic case of syphilis, which doubtless was the opinion of the ward surgeon.

In these doubtful cases the dark field examination will prove of great advantage in clearing the diagnosis. The presence of the treponema pallida, even in small number, is pathognomonic of syphilis. The same cannot be said of Vincent's angina organisms, as they are fairly constant inhabitants of the mouth, especially about carious teeth. However, the presence of a large number of coarse coiled spirochetes and fusiform bacilli is regarded as the causative factor where the treponema pallidum is absent. The motility of the Vincent's organisms is distinct from the treponema pallidum under the dark field; the spirochete and fusiform bacillus have a rapid, darting movement across the microscopic field, the Vincent's angina spirochete having also a rapid rotary motion on its long apex. The treponema pallidum likewise rotates on its long axis, but does not have such rapid movement of translation, and does not so rapidly move out of the field of the microscope.

The cooperation of Major Frank E. Burch, M. R. C., in presenting these cases for study and furnishing clinical data is hereby acknowledged.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Foreign Bodies in the Larynx (Leeches).

NAVARRO.

Rev. hebd. de laryngol., etc., Paris, 1917—XXXVIII—290.

Navarro has had more than a hundred cases of a leech in the larynx. The trouble is most common in Andalusia and Cordova, Spain, where during the summer months ignorant agricultural laborers often drink hastily from ditches. At the moment of deglutition the animal as a defensive measure attaches itself within or about the larynx. Symptoms vary, of course, according to the site of attachment. Hemorrhage by mouth is a constant symptom, the blood being partly filled and partly half digested clots. Loss of blood may lead to marked anemia. According to the point of attachment, the special symptoms vary from none at all to imminent asphyxia. On laryngoscopic examination, the leech may be found on the edge of the epiglottis, or on its posterior surface, or either commissure, or on the cords or below them. One of Navarro's cases was that of a woman, aged seventy years, who had an enormous leech attached to the anterior commissure so that its body acted as a valve, almost preventing respiration. Treatment is by extraction with the Krause forceps. Navarro warns against cocainization, as the animal may release its hold and drop further into the larynx or trachea. Some of his colleagues, however, use cocain in strong solution, so that the leech relaxes and can then be expelled by the patient's coughing. A. Miller.

Endolaryngeal Ecchymosis Following Contusion of the Larynx by Shock.

LIEBAULT.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—337.

A sublieutenant was wounded in the face and neck by a reflected bullet. When seen he was aphonic and complained of laryngeal pain and slight dyspnea. On the left side of the neck was a superficial wound of the skin. The larynx seemed to be pushed over to the right. Palpation produced a little

pain, but no crepitus or sign of emphysema. Laryngoscopy showed a diffuse redness of the larynx; the left ventricular band was markedly swollen and ecchymotic; vocal bands normal and without paralysis. In a few days the swelling of the ventricular band became of a violacious hue, then disappeared, and the voice was regained. This is the only case of the kind that Liebault has seen during the war.

A. Miller.

Luetic Paralysis of Right Vocal Cord.

DAVIS, GEORGE E.

Laryngoscope, St. Louis, 1917—XXVII—895.

The writer presents a case of patient, twenty years old, with sore throat, speaking and swallowing difficult, voice husky, enunciation indistinct. The soft palate was drawn up, uvula displaced, midway between center and left tonsillar pillar. Pharynx and tonsils not inflamed, though the tonsils probably were the seat of infection. There was paralysis of the right vocal cord and right side of the pharynx and larynx.

Family history revealed father's death at the age of fifty-four, of Bright's disease, mother's at the age of thirty-four years, of pulmonary tuberculosis. Two sisters and one brother are living. When ten years old the patient had a severe illness, either typhoid fever or meningitis, followed by deafness in the left ear. The right ear showed low notes normal, but high notes lowered at times; stuffiness and tinnitus in right ear. Hypertrophy of the thyroid, more on the right but not enough pressure on recurrent laryngeal to produce paralysis of the cord. Diminished muscle tonus of right arm and leg, and reflexes on right. Total deafness on left and shortened right bone conduction led the writer to conclude that there was a luetic origin of paralysis; this was confirmed by a plus four Wassermann.

Wright and Smith say: "Cortical tumors, hemorrhages, degenerations, meningeal inflammations and cranial depressions are hardly regarded as causing laryngeal paralysis, but may be associated with central lesions due to syphilis."

As proven by clinical experience, the seat of luetic lesion

responsible for laryngeal paralysis is in favor of the fourth ventricle. Paralysis in present case showed that a unilateral lesion in the bulb may cause a unilateral paralysis of the cord on the same or opposite side, depending on whether the lesion is about or below the decussation of the nerve supply. The loss of ear function may have been peripheral, affecting the end organs of the eighth nerve. The loss of ear function appeared ten years before the present clinical pharyngeal and laryngeal symptoms, the date of the anatomic lesion of laryngeal paralysis is questionable. The abductor nerve supply is the first to go in progressive lesions, and unilateral median position of the cord does not affect the voice and respiration at the initiation of the paralysis, therefore sudden and difficult vocalization and deglutition are not proof of the simultaneous occurrence of the paralysis.

The writer concludes that the paralysis is of long standing and the sudden symptoms were due to acute cold.

J. A. Stucky.

Swallowed Thread as Guide in Instrumentation of Narrowed Esophagus; Report of Case of Cardiospasm in Which Method Was Employed.

WHITEFORD, C. H.

Practitioner, Lond., 1918—C—81.

Report is made of a case of strictured and dilated esophagus treated after the method of Dr. H. S. Plummer, who has perfected the technic of Mixter's modification of Donham's method of having patient swallow a string as guide for later passage of sounds. Dr. Hamilton quotes Dr. Plummer's two rules of safety: "First, that the tip of the instrument must be constantly under guidance of vision, or that the instrument must follow a guide in such a way as to make perforation of the esophageal wall with its tip impossible." For the first the esophagoscope is necessary. For the second an olive tipped sound perforated from apex to shoulder for the passage of the thread is necessary. In the reported case a thread fifteen feet long reached from the incisor teeth to the anus. The sound was kept under vision by the fluorescent screen. This enables operator to be sure of entry into stomach.

E. R. Holmes.

An Implantation Cyst of the Larynx.

DEAN, L. W., AND GREGG, J. B.

Laryngoscope, St. Louis, 1918—XXVIII—74.

Implantation cysts are caused by punctures from awls, forks, needles, thorns, glass, etc., causing intrusion of the epithelial cells into submucous tissues. They vary in size and look like inverted skin covering. The writers have not found a case of implantation cyst of the larynx in any literature. The ordinary cysts of the larynx are found in anterior surface of epiglottis, within the larynx, on the true cords, as large as the epiglottis, or on the lateral wall. They may be very small on the cords or large, as on the epiglottis. They are of two kinds: (1) Glandular cysts, rare in the larynx and due to the dilatation of the gland acini and ducts. The nature of the growth being difficult to determine. (2) Connective tissue cysts, due to localized effusion of serum under epithelium, between it and the stroma, making a protuberance which collapses if punctured. Or the cyst may be traversed by fibrous threads and bands.

A detailed history of an interesting case is given.

In all cases of tumors of the larynx it is well to consider diagnosis of implantation cysts of the larynx.

J. A Stucky.

Lymphangioma of the Larynx.

RICHARDSON, CHARLES W.

Laryngoscope, St. Louis, 1918—XXVIII—8.

In this paper the writer says the number of such cases reported is forty-one, and none presented the physical or gross appearance as the one shown by him. The patient, a man thirty-two years old, was seen by family physician, who found him with difficult breathing and deglutition. Ten years before, his voice became muffled and a laryngoscope examination showed tumor in larynx. The writer's examination showed voice muffled, breathing fairly easy, but the patient threw his head up frequently, making an empty swallow, which he said made him breathe easier. He complained of

inability to ingest food. His breathing became embarrassed during deglutition, he feared table food, and lost flesh rapidly. The choking was worse at night, causing loss of sleep. There was nothing abnormal in the nose and fauces. When the larynx was examined a large bluish gray mottled mass appeared, filling the supracordal portion of the larynx. It was round, smooth, without ulceration, soft and pultaceous. The deeper portions of the larynx were visible. Its origin was from the right false card, the ventricular wall extending to the aryepiglottidean fold and posteriorly to the arytenoid. It rested on the left false cord and extended on a level with the left aryepiglottidean fold. The peculiar movement of the head raised the growth allowing more air to pass through space opened. The writer concluded that the growth was not malignant. If carcinomatous, it would have shown ulceration. If melanosarcoma, it would have been fatal. And while it resembled angioma it had no history of hemorrhage. After cocainizing the larynx, a laryngeal knife plunged into the mass caused trivial loss of blood. Both larynx and pharynx were cocainized with a twenty per cent solution of cocain. The snare wire would not slip below the growth, so it was engaged by the left index finger and introduced into the larynx, raising the mass. This caused slight bleeding. The growth was a large pultaceous mass of blue gray mottled appearance, five centimeters long, containing lymph or venous sinuses with bloody thick fluid flowing. Microscope showed that the neoplasm was composed of firm fibrous tissue, the interior arranged in branching and villous form, enclosing cavernous sinuses which were lymph sinuses. It was covered with stratified, squamous epithelium. Blood vessels were numerous in the periphery. Extravasations were present in fibrous structure, containing pigment granules. The fibroblasts were aggregated at a few points. The tumors might be called a hemorrhagic cavernous fibroma or lymphangioma. It was interesting because of the unusual size, of the laryngeal neoplasm, its color and gross appearance, the absence of difficult breathing with so large a neoplasm filling the vestibule of the larynx. The true angioma is removable only by laryngofissure. The endolaryngeal removal is too dangerous on account of uncontrollable hemorrhage.

The end results of this case will be watched with interest. The abstractor had a case similar to this one, with return of the growth in less than two years, resulting in death from inoperable lymphosarcoma with metastasis.

J. A. Stucky.

Mechanical Spoon for Esophagoscopic Use.

JACKSON, CHEVALIER.

Laryngoscope, St. Louis, 1918—XXVIII—47.

Friable substances such as meal with kernels and substances too large to be grasped with forceps, are better removed with a mechanical spoon constructed like the author's safety pin closer, which is satisfactory. The spoon has been made a larger, shorter, heavier model for use in the esophagus below the cricopharyngeal constriction. Illustrations are given of the model.

J. A. Stucky.

Stammering.

TOMPKINS, ERNEST.

Med. Rec., N. Y., 1918—XCIV—62.

Whether the stammerer's nervousness is antecedent or resultant is a much discussed phase of the disorder. Temporary nervousness following shock or illness is a great inducing cause, and that has been considered permanent without due warrant. That the extended nervousness is resultant ought to be evident; for the disorder is a constant mental torture, and any animal can be made nervous by constant torture.

There are very many reasons why heredity cannot be accepted in the case of stammering; no satisfactory evidence of it has ever been presented; some of the alleged proofs of it turn out to be positive disproofs when they are examined; and no theory of the disorder involving heredity has ever been sustained.

Health and stigmata of maldevelopment may be considered together. It is unquestionable that stammerers have ailments just as other people do; but no connection between those ailments and the stammering has ever been shown.

As to treatment: The speech interference theory gives us the etiology, the common causal factor, the causes of origin by imitation, sex discrepancy, and many other features which are every day pronounced unknown. Indeed, it satisfies every requirement, so, in the words of Haeckel, "we are bound to adopt it"—that is. some of us who are scientific.

Emil Mayer.

Acute Primary Perichondritis of the Larynx.

CANUYT, GEORGES.

Rev. de laryngol., etc., Paris, 1918—XXXIX—49.

Under the designation of acute primary perichondritis of the larynx is included a morbid state characterized by the acute inflammation of the cartilages of the larynx.

Acute or chronic inflammations of the cartilages of the larynx may be encountered in many diseases affecting the larynx, more or less serious, such as syphilis, tuberculosis, etc., or even in the course of certain types of laryngitis accompanying eruptive fevers. These, however, concern secondary perichondritis, which is described under the head of bacterial and syphilitic laryngitis. Likewise following a traumatism and especially a war wound, perichondritis is an almost invariable complication when the cartilages of the larynx have been injured. It then concerns a secondary traumatic perichondritis. These several types of perichondritis are secondary to a general infection or to a traumatism; the perichondritis then is only a step in the inflammatory or ulcerative process.

On the other hand, primary perichondritis deserves to be studied and described. This affection, whose existence is denied by some authors and ignored by the surgeons and most of the specialists, exists unquestionably, according to the testimony of Moure, Macdonald and Lenox Browne. We have had the opportunity of observing several cases. It is a rare and often very serious disease.

Acute inflammation of the cartilages of the larynx may have two entirely distinct aspects: the circumscribed form and the diffuse form.

(a) Circumscribed Form.—The symptoms which accom-

pany the evolution of circumscribed laryngeal perichondritis are at once severe pain as the dominant symptom; the patient holds his hand at his neck; has spontaneous pain, which is increased by swallowing. The voice is always hoarse, sometimes choked, but the phonetic disturbances vary. The cough, which is dry at first, finally becomes rough, depending on the state of the larynx. Respiration is normal—in fact, in the circumscribed forms the lesions are localized at the level of the thyroid region of the vocal organ; there are no respiratory symptoms.

On external examination the patient stiffens his neck, which is increased in size, for the thyroid cartilage is swollen and deformed, the natural projections are effaced. On palpation the perichondritis is limited to the lamellæ of the thyroid cartilage. There is a more or less regular swelling at its surface which may be on one side or bilateral. Exploration of the affected region shows a very severe pain localized in one of the plates of the thyroid. When the finger is placed upon the larynx or the trachea a very notable increase of the vibrations is noticed, due to the movement of the inspired or expired air on the infiltrated and rigid walls. When the patient speaks in a loud voice the sensation of an increase of laryngotracheal vibrations is more easily observed. The infection is especially marked at the level of the external perichondrium. Macdonald insists on what he calls the agglomeration toward the median line of all the tissues of the larynx under the pressure of perichondrial swelling.

Laryngoscopic Examination.—Some roughness and a slight swelling of the vocal mucosa will be found.

According to Lenox Brown, when the thyroid cartilage is affected unilaterally, more or less hyperemic swelling of the ventricular band of the affected side is found.

In the course of this acute infection of the laryngeal cartilages the infiltrated cartilage sometimes takes the aspect of a carapace, as in cancer of the larynx when the tumor infiltrates the thyroid shell. Often when the swelling is localized the skin is distended by a purulent collection, more or less abundant, which raises it, attenuates it and may even perforate it.

The perichondral abscess thus formed is seen externally,

and the existence of denuded or partly necrosed cartilage may be recognized by means of a probe. Finally, this cartilage will be extruded through the fistulous tract which follows the opening of the abscess. It is even possible to remove at the beginning the sequestrum contained at the bottom of the abscessed cavity. Thus the fragments of the thyroid or of the cricoid which are affected by perichondritis then necrosed may be thrown out spontaneously.

But necrosis is not the necessary consequence of perichondritis, and Lenox Brown states that it is not uncommon for this inflammation to resolve without loss of substance.

The general signs are always marked. The patient has a tired look from suffering and lack of food; the temperature is high, and the pulse always rapid. Circumscribed laryngeal perichondritis evolves as an abscess localized in the thyroid or cricoid region; the perichondrium is inflamed, then the cartilage is necrosed, while the peripheral tissues are infiltrated, deformed and opened externally if the surgeon has not intervened soon enough to give outlet to the purulent collection which is formed—that is to say, in the course of several days or even of several weeks.

The prognosis of this clinical form is considered relatively benign. The patients recover with loss of a portion of the cartilage. The loss of substance is seldom severe enough to result in an appreciable deformity of the vocal organ, as in certain tubercular or syphilitic perichondritis or the types following eruptive fevers or fractures or wounds of war.

(b) The Diffuse Form.—The onset is abrupt, like that of a marked infection. The pain, as in the preceding form, constitutes the main symptom; it is spontaneous, very severe and occasions much complaint from the patient. Deglutition is painful from the time the larynx begins to rise; it can either become extremely difficult or even impossible if the perichondritis is generalized, the cartilaginous passage being moved only with the greatest difficulty. In the beginning these painful phenomena dominate in some way all the other functional symptoms. Great importance should be attached to a sudden pain in the anterior cervical region.

Respiration, which is normal at first, may finally become very painful—in fact, when the motility of the infiltrated ary-

tenoids is affected dyspnea appears and may become most intense.

Respiratory disturbances, almost lacking in the circumscribed forms, are manifest in the diffuse forms, by a very pronounced stenosis due to the infiltration and swelling of the laryngotracheal tube, even to the concomitant edema.

There may be phonetic troubles if the swelling of the cords and their state of asynergy prevents their vibration or prevents their normal tension. Speech being painful, the patient talks in a low voice and seems to have a true phonophobia.

Upon examination, the lesion localized in the beginning in the thyroid cartilage is found to extend rapidly to the entire laryngotracheal passageway. The neck of the patient has an infiltrated appearance, stiff, moving with difficulty. In these cases the trachea may have such a volume that it reaches the sternum.

On palpation, all the prelaryngeal tissues from a solid attachment to the larynx; but in spite of the swelling it is easy to note that the injury belongs to the thyroid cartilage and not to the thyroid body, which is an important factor in the differential diagnosis. In fact, the thyroid lamellæ are very painful, the larynx is increased in volume, but the thyroidal lobes do not participate in the infection, or but little.

On laryngoscopic examination, generally difficult, diffuse roughness is noted and more or less marked swelling of the arytenoids and the ventricular bands. Rarely, the epiglottis is infiltrated. The vocal cords are stretched and come together badly, causing the stifled character of the voice. In this diffuse form, contrary to the circumscribed one, the formation of a purulent collection is exceptional. The entire laryngotracheal tube and perhaps even the first bronchial divisions are tumefied and infiltrated, and the patient succumbs after three or four days of illness, without any intervention whatever possible to save his life, which from the beginning was threatened.

These are cases of perichondritis, truly dreadful, fortunately rare, against which we are very poorly equipped. It is a sort of woody phlegmon evolving the laryngotracheal passage and the tissues around it, capable of extending as far as the

mediastinum; it resembles those fatal phlegmons of the subhyoidal region in which the pus has not had time to form.

The general phenomena are well marked, and from the beginning the temperature ranges from 38° C. to 40° C., and even to 41° C. in severe forms. The patient suffers from fatigue, anorexia, and has in his face the imprint of a deep infection. His state becomes rapidly desperate. In fact, diffuse perichondritis at the first onset invades the entire laryngotracheal passage. It is very serious, for in several days a purulent collection more or less abundant is produced, and a rapid decline of the patient, who is quickly carried away by the hectic fever and bronchopulmonary infection. This description indicates the difference between the evolution of benign circumscribed perichondritis and that of the well diffused and fatal type.

The prognosis is almost always fatal. From the onset the patient is stricken with death, with some rare exceptions.

Two observations are reported of serious primary laryngeal perichondritis. The history of the first patient, as reported by Professor Moure, shows the gravity of the affection; the second case is as reported by the writer.

Case 1.—Mr. X., twenty years old, in military service, came to the infirmary complaining of pain in his throat, discomfort in swallowing, and general fatigue. The doctor who examined him, having found nothing abnormal, put the patient to rest for twenty-four hours. The next day, the troubles having increased, the young man went to the infirmary, where they found symptoms of grippe. He had pain in swallowing and even in speaking; he suffered violent pains in the nasopharynx, had a rather dry cough, and a generally poor condition.

The symptoms continued to increase; his temperature was 40.4° C. The facies was anxious, his neck hard to move and slightly swollen in the anterior region.

The family of the young man obtained permission for him to go home, where his regular physician cared for him. At that time the patient was in a bad general condition, the temperature ranging from 39° C. and 40° C., a slight roughness in his voice, difficulty in swallowing and pains in the neck. No pain in respiration, but respiration slightly hissing.

Forty-eight hours afterwards, the symptoms continuing to increase, the doctor called Professor Moure in consultation. At his arrival the patient was found suffering from fatigue, anxious facies, a roaring respiration; a temperature of 40° C. His neck was rigid, moved with difficulty and was extremely painful on pressure. On palpation it was impossible at any place to define the area which separates the thyroid from the cricoid, and the latter from the trachea. The laryngotracheal passage was transformed into a rigid swollen tube resting on the sternum, over which it projected slightly. It resembled a woody phlegmon of the anterior part of the neck, making movements of deglutition almost impossible.

The pulse was weak and thready, as in serious infections.

In the presence of this situation, which seemed very serious, the author made the diagnosis of laryngotracheal perichondritis of grippal origin, and the seriousness of the prognosis was not concealed.

Inhalations were prescribed, some injections to improve the general condition, but the symptoms increased, and forty-eight hours after, the patient succumbed without presenting real respiratory symptoms which would have suggested tracheotomy, and also without any formation of pus in the anterior region of the neck, which was always woody and very painful.

This was a very rare example of diffuse primary laryngotracheal perichondritis, the diagnosis of which was most difficult at the beginning, and against which a treatment as energetic as it was, remained absolutely inefficacious.

Case 2.—Acute Primary Laryngotracheal Perichondritis; Recovery.—An Arab who complained for five or six days of pains in the level of his neck was sent to Professor Moure, because the functional signs were increased in acuteness and general signs began to appear.

On examination, the patient was found fatigued, downcast and suffering great pain in swallowing his saliva. The subhyoidal region was tumefied, stretched, of normal coloring, and on palpation a thickening was felt reaching from the hyoid bone to the sternum, which obliterated the grooves and ordinary anatomic depressions. In fact, all the spaces of the anterior region of the neck had disappeared, and the thyroid and cricoid cartilages and the trachea seemed a hard and tense

block. At the inferior part the trachea touched the posterior part of the sternal notch. Palpation exhibited exquisite suffering, especially at the level of the thyroid. In other words, there was a diffuse thickening which included the thyroid body and the laryngotracheal region.

On laryngoscopic examination the aryepiglottic folds were found red and tumefied, and the entrance of the larynx was filled with purulent mucus.

The patient had a temperature of 38.7°C.; pulse, 130; infrequent urination, with albuminuria; general condition unsatisfactory. The prognosis was very grave. The treatment was as follows:

(a) Local.—Fumigations, warm damp dressings and belladonna ointment over subhyoid region.

(b) General.—Intravenous injections of camphor water, collargol and electrargol.

In the succeeding days progressive and continuous amelioration was manifest by a diminution of suffering, an abundant diuresis, a better local state, a retrogression of the general phenomena.

At this time the patient, who had caused us uneasiness, was out of danger, and eight days after he was dismissed as cured.

Diagnosis.—The following questions are to be answered:

1. Is there perichondritis? If so,
2. Is the perichondritis secondary or primary?
3. If it is primary, is it a localized benign form, or diffuse and serious?

Differential Diagnosis.—Perichondritis must not be confused with the following affections:

(a) Prethyroid Adenitis.—Well studied and described by Liebault, it begins ordinarily in the anterior part of the neck at the level of the portion corresponding to the angle of the thyroid cartilage. If there exists at the level of the thyroid cartilage a tumefaction giving the sensation of a diffuse fluctuation, it is difficult at this period to make the differential diagnosis between perichondritis and prethyroid adenitis. It should be remembered that the latter has a slower evolution and has no general phenomena. In adenitis palpation is not at all painful; on the other hand, the skin, more tense and thinned, has a more spread and diffuse violet coloring than

in perichondritis. When the cartilage is affected it is only at the point where the opening of the abscess is made that the skin is thinner and takes the reddish coloring characteristic of a certain infection. When a perichondritic abscess is opened there is a more or less free discharge of pus, and the sound or curette introduced in the cavity shows the presence of a denuded cartilage, rough, necrosed in part. In prethyroid adenitis the tumefied pouch contains hardly anything but soft fungosities surrounded by a sort of discharge more or less purulent, as is found in suppurated adenitis; often the pus is grummous as in the latter case, and the cartilage is still covered with its perichondrium slightly red and thick; the subjacent muscles are intact; the sound strikes soft and infiltrated tissues and not denuded and diseased cartilage.

In résumé, the lesion of adenitis is superficial; that of perichondritis is deep.

The laryngoscopic examination is negative.

(b) Acute Thyroiditis.—This affection is localized in the thyroid body. The tumefaction assumes more the form of the isthmus and the thyroid lobes stretching more to the side. But at the anterior part of the neck above the thyroid, the thyroid cartilage, the cricoid and especially the Adam's apple, are perceived at palpation; they are brought to the same plane as in perichondritis, and they do not comprise the diffuse mass that has been described.

On the other hand, this characteristic is important; the laryngoscopic examination is absolutely negative.

(c) All acute affections of the subthyroid region.

Logically they must be eliminated, as in all anatomic diagnosis they must pass in the theoretic review. Practically mistake can be made only with prethyroid adenitis, and especially with acute thyroiditis.

But it must be determined whether the perichondritis is secondary or primary.

TYPES OF SECONDARY PERICHONDRITIS.

(a) Tubercular perichondritis is preceded and accompanied by characteristic laryngeal lesions. In fact, this complication comes only at the third period—that of perichondritis or necrosis. The ulceration increases in depth and affects the car-

tilage and perichondrium, constituting the stage of caries and necrosis, according to Lambert.

(b) Syphilitic perichondritis is characterized by a limited inflammatory zone which increases the dimensions of the vocal organ, and a cartilaginous necrosis with increase in the volume of the perichondrium. In certain forms the cartilage and the perichondrium are invaded first, and ulceration is secondary. Then there is a very rapid disorganization of the structure of the larynx.

In these forms of perichondritis the tumefaction is visible externally, and this special characteristic of perichondritis is common. It cannot be confused with primary perichondritis, for even if inspection and palpation give the same result, the evolution of syphilitic perichondritis is slow, not painful, and laryngoscopic examination shows the signs of the process.

(c) Neoplastic perichondritis is a terminal complication. In fact, the patient has come to the period of painful respiration, of cachexia and of exteriorization of the neoplasm. In this stage the tumor breaks the limits of the larynx and attacks the cartilages, the ganglia, etc. The vocal organ is entirely enclosed in a thick mass, adherent and voluminous. Confusion is not possible.

(d) Secondary Perichondritis With Eruptive Fevers.—1. Scarlet fever. In certain cases there is such virulence of infection that supraglottic and subglottic edema is produced and ulcerations which increase in depth and which may attack the cartilage, from which perichondritis may go on to suppuration.

2. Laryngotyphoid. In these cases the arytenoids, the aryepiglottic folds, the epiglottis and the subglottic region are swollen in a mass, and the ulceration, at first superficial, increases in depth and attacks the subjacent cartilage, which becomes necrosed. Ordinarily the cricoid is affected, first by the necrosis, then the arytenoids, and finally the thyroid cartilage and the epiglottis. The external palpation of the vocal organ shows ordinarily the presence of a thickening of the larynx with changes in the fibrocartilage. These types of perichondritis are recognized easily by their evolution, by clinical examination, and especially by the history of the infection.

(e) Secondary Traumatic Perichondritis.—It is difficult to confuse a primary perichondritis with a secondary form when there is a traumatism. In the course of war this complication is almost invariable when the cartilage has been injured. Whenever the thyroid has been struck by a projectile it presents infiltrated, tumefied, thick patches, which are extremely painful on palpation.

In acute cases the patient has severe spontaneous pains in his neck, which pressure increases; the attitude of the patient will be peculiar; head is fixed in a median position and half bent in order to relax the muscles of the cervical region and to immobilize as much as possible the laryngotracheal passage. This latter is swollen; on palpation all the projections of the laryngotracheal tube are absent. The hand feels something like a shield, like a fixed mass in front of the thyroid cartilage and of the cricoid, extending back and on all sides. On laryngoscopic examination the arytenoids are found swollen and the larynx is edematous.

The general signs are marked: the temperature ranges between 38° C. and 40° C.; the pulse is rapid, the appearance tired and the general condition very poor. This clinical picture resembles that of primary perichondritis, but secondary traumatic perichondritis is a less serious affection, the diagnosis of which is simple. In fact, the history of the projectile, the orifice of entrance and exit of which is known; it is only several days after the injury that the patient complains of cervical pain and presents at the level of the thyroid cartilage the characteristic mass. In addition to these, the accompanying general phenomena should demonstrate the presence of a laryngotracheal perichondritis of traumatic origin.

Positive Diagnosis.—Acute primary perichondritis will be recognized by the fact that there is a cartilaginous lesion alone and well defined in the circumscribed forms. The diffuse and serious form must not be confused with other lesions; the ensemble of the general condition is very important.

Treatment.—1. Circumscribed perichondritis. The treatment should consist, if the patient is seen at the beginning of the infection, in an application of belladonna ointment to the cervical region, in moist dressings, and finally in laryngeal sprays. If in spite of this resolving treatment the perichon-

dritis continues to evolve, and there is a formation of a purulent collection, incision is necessary. Early incision has the advantage of circumscribing the perichondritis, in some measure, to the part first affected, and may prevent the formation of a sequestrum which can result in a chronic fistular passage. The incision should be large and sufficient to allow the complete curetting of the infected cavity. The part of the diseased cartilage should be sought for and recognized so that it can be disinfected carefully. A good drainage should be left.

Simple types of perichondritis are ordinarily cured in a few days without leaving any trace of their occurrence, contrary to the secondary types with eruptive fevers, for example.

2. Diffuse Perichondritis.—The diagnosis must be made immediately; delay is fatal.

The local treatment is the same as in the circumscribed form. General treatment should be instituted quickly, because there is a general intoxication of the organism. The following may be found of use: Injection of colloid melats and of camphor water, according to Murphy's method (drop by drop per rectum) with glucosed serum.

These artificial means of defense to conquer a very serious infection should give some unhoped for cures. Unfortunately, generally all means are ineffectual, and the patient succumbs. Tracheotomy itself, which seems theoretically indicated in these serious cases, becomes useless because the lesion involves the entire laryngotracheal lumen, and because the patients succumb to the progress of the general infection rather than to the local respiratory difficulty.

V.—MISCELLANEOUS.

Malignant Neoplasm of the Thyroid With Metastases in the Intestine and in Bone.

BINNIE, J. F.

Surg., Gynec. and Obstet., Chicago, 1918—XXVI—288.

The chief points in the history of this male patient, age fifty-three years, are years of constipation and indigestion. Thirty years ago he had a penile sore diagnosed as luetic and was treated for three or four months without any further luetic symptoms. The patient had personal knowledge that

his larynx had been deviated to the right for twenty years, and recently he had noticed a small hard lump in the region of the thyroid. The patient was suddenly attacked with an acute intestinal obstruction, for which, under gas ether anesthesia, abdominal section was performed and an intraintestinal neoplasm found. Lateral anastomosis was made between points above and below the diseased segment, which was excised, its length measuring about fifteen inches. Uneventful recovery followed. About five and a half months later the gradual increase of the size of the tumor of the thyroid caused dysphagia and a persistent hacking cough but no pain. The tumor was hard, not adherent to the skin, moved with the larynx in deglutation, extending from opposite the upper hyoid cornu to about one finger breath above the clavicle and was about two inches wide.

On the outer and posterior surface of the upper end of the right humerus was a tumor about twice the size of a hen's egg, situated beneath the insertion of the deltoid. The tumor was smooth, rounded, elastic, tender, and had developed during the past five months. The X-ray showed that the tumor has eroded about two-thirds of the thickness of the humerus to which it was attached. The patient had been treated with mercury and sodium cacodylate because of the luetic history, had gained about seventeen pounds, of which he has recently lost six pounds, and was less troubled with cough and dysphagia. One Wassermann test was said to be positive and another was negative. A belated report on the intestinal tumors consisting of multiple polypi stated they were malignant and were composed of thyroid tissue or at least of tissue belonging to the endocrine system.

The tumor was excised from the shoulder, proving to be a soft spindle celled sarcoma. A few weeks later the left lobe of the thyroid was excised, and was reported pathologically as identical in structure with the intestinal polypi removed six months previously. The question arose as to which was the primary growth. The author is inclined to believe that the primary disease was located in the thyroid, while the bone and intestinal neoplasms were metastatic. He closes with a comparison of the reported cases in the literature with his own.

Jos. D. Heitger.

The Value of Dichloramin-T Chlorcosane Solution (Dakin-Dunham) in the Treatment of Infections of the Upper Air Passages.

DELAVAN, D. BRYSON.

Med. Rec., N. Y., 1918—XCIV—89.

In the upper air passages the dichloramin-T may be used with advantage under three different conditions: (1) To prevent the development of newly acquired infection; (2) to overcome the acute results of infection; and (3) to abolish the bacilli persisting in carriers.

Thus, it has been found effective in the prevention of cerebrospinal meningitis and of measles through its early application in subjects who have been exposed to those diseases, and in other analogous situations it has proved a valuable safeguard.

In the case of the tonsil it is the crypts which harbor the most persistent of the offending organisms. It is absolutely essential therefore that these crypts should be disinfected to their lowest depths. In the nose the complicated structure of the superior half of the nasal cavity necessitates that it receive special attention.

First, cleanse the mucous surface within reach with some simple alkalin spray. Follow this with a spray of adrenalin, the adrenalin spray to be repeated until the upper parts have been successively opened and the whole way to the roof of the nasal cavity is clear. Then, and not until then, and guided by a clear demonstration of the parts by a good light and a nasal speculum, the dichloramin-T spray can be thrown to the remote parts which most stand in need of it, and the disinfection of the region made complete. While it may be said that this method, thorough as it is for the nose, does not reach the nasal sinuses, it nevertheless has proved more practically effective than any other method of which we know.

The disinfection of the vault of the pharynx may be secured by first applying the adrenalin to the soft palate and the lateral walls of the pharynx, thus facilitating the complete introduction of the spray.

In cases where no obstruction exists, or where for any reason the immediate removal of adenoid enlargements is not advisable, the dichloramin-T chlorcosane solution seems to

offer the best hope of a speedy cure. If, as is the fact, complete disinfection can be accomplished in uncomplicated cases with as few as three, two, or even one treatment, the superiority of the method over others is beyond question.

The writer concludes:

1. The recognition of the principle upon which success absolutely depends, namely, that in order to carry the dichloramin-T chlorcosane solution to the chief foci of infection, these foci must first be thoroughly exposed, as described above.

2. The application of the dichloramin-T solution by means of a properly constructed spray atomizer, the air current being supplied if possible from an air condenser and not by means of an India rubber handball.

3. The devotion of time and painstaking care to the effective carrying out of the treatment. Emil Mayer.

Some Cases of Facial Deformity Treated in the Department of Plastic Surgery at the Cambridge Hospital, Aldershot.

GILLIES, H. D.

J. Laryngol., etc., Lond., 1917—XXXII—274.

Three cases of war injuries of the face are presented, illustrated by photographs before and after plastic repair had been carried out. The results show how well a serious deformity can be corrected and a pleasing result produced.

The operative procedures are illustrated by diagrams.

Case 1.—Formation of the upper half of the bridge of the nose. The loss of tissue comprised: (1) The nasal bones, underlying portion of septum, frontal spine and upper portions of the nasal process of superior maxilla, the skin and the right eye. First operation: Excision of scar. Submucous resection of a portion of the perpendicular plate of the ethmoid, which was swung forward to form a bridge, and sutured below to septum of lower nose. Two sliding lateral flaps from the cheeks were sutured over this bridge. Result: Flaps healed, bridge gradually sank. Second operation, four months later: Small skin incision; skin undermined from below upwards. When frontal bone was reached periostium raised, and a piece of rib cartilage inserted. Fitting of artificial eye completed a good cosmetic result.

Case 2.—Temporal muscle transplantation for deformities caused by loss of malar bone: A free graft of fat or cartilage is liable to become infected. Celluloid plates are found unsatisfactory. Temporal muscle flaps in a good many cases have had uniformly good results. U-shaped incision in hairy scalp exposes temporal muscle; anterior third or two-thirds of muscle is elevated from bone, passed under bridge of skin and sutured to deep tissues below the eye.

Case 3.—Describes how a destructive injury of the mouth and cheeks can be repaired: in this case so successfully that the man was able to return to duty. A. J. Brady.

Extraction of Foreign Bodies From the Upper Part of the Prevertebral Region.

PATEL AND ARCELIN, Rev. de chir., Paris, 1917—LII—640.

The writers refer only to the first three cervical vertebræ, the region bounded anteriorly by the posterior wall of the pharynx, and externally corresponding to the maxillopharyngeal space. It is divisible into two regions, the prevertebral proper, limited by the prevertebral aponeurosis and the posterior subglandular space of Sebileau. The latter is characterized by the presence of large vessels, and contains in its center the styloid apophysis. In the former are no vessels, and it is entered by the retrosternomastoid route. The latter is entered by an anterior sternomastoid cervical incision, preceded by tamponing of the lateral sinus.

Most projectiles enter through the nasal root. Those which enter through the neck probably wound the large vessels and cause immediate death. Their locations are: (a) In the prevertebral muscles behind the aponeurosis; (b) astride the aponeurosis, especially if due to shrapnel; (c) in the body of a vertebra, projecting into the prevertebral space, and (d) in the anterior arc of the atlas and occiput.

The first symptoms are those of the lesion of the neighboring structures, especially hemorrhages. When they have passed away, we find difficulty of rotation, fixation and inclination of the head, and dysphagia.

In making radiograms, two poses must be taken, one frontal and one profile. The location of the foreign bodies is made as follows:

(a) Those of the prevertebral region in the frontal picture are at a little distance (up to three centimeters) from the median line, at the level of the upper maxilla or in the angle of the two maxillæ, at the level of the first three cervical vertebræ. In the profile view they lie behind the prevertebral aponeurosis or astride it.

(b) Those of the vascular or styloid region lie further away from the median line, near the styloid process. In the profile view they are generally somewhat higher. They may appear behind the aponeurosis, but this is an illusion.

(c) Those of the pterygomaxillary region have a characteristic radiogram. Like the preceding, they lie far outside of the median line near the styloid, but in the profile view they appear in the middle of the ascending ramus of the inferior maxilla.

The routes for operating are the following: The pharyngeal, the anterior sternomastoid cervical, and the posterior sternomastoid cervical. The last is the one of choice, as it directly enters the region, pushing forward the vasculonervous plexus.

Six cases are described, all operated by this route, with removal of the projectile and cure.

Survey of Head Surgery, Office of Surgeon General, U. S. A., Washington, 1918—I—62.

Gauze Mask in the Prophylaxis of Contagious Diseases.

BERNARD, A.

Progrès méd., Paris, 1918—XXIII—175.

The ordinary method of wearing a gown while treating cases of contagious disease is insufficient to protect those coming into contact with them. The germs present on the nasal and oral mucous membranes are breathed, coughed or sneezed into the air, and attack the physician, etc. This danger is somewhat obviated by placing the patient in boxes with elevated sides. A better way is to surround the patient with mosquito netting suspended over the bed like a curtain, which is sprinkled a couple of times daily with a weak solution of eucalyptol, etc. This has been used successfully in military service by Medical Inspector General Lemoine. Weaver ad-

vised the wearing of a gauze mask to protect the physicians and nurses, as well as to prevent them from becoming carriers of the infection. It covers the face from the chin to the nose, being tied back of the head. From June, 1916, to December, 1917, not one of seventy-three nurses in the scarlet fever wards were infected, although in three previous years there had been nine cases. He concludes: (1) The mask notably diminishes contagion; (2) this is due to the fact that it prevents the infection of the nasal mucous membranes of the attendants.

Surgery of the Hypophysis.

NOVAES, JULIO.

Brasil méd., Rio de Jan., 1917—431.

The writer analyzes the monograph of Prof. Segura of Buenos Ayres, showing grave defects in diagnosis and technic.

J. Szymanski.

Treatment of Whooping Cough.

FONSECA, CESAR.

Brasil méd., Rio de Jan., 1917—380.

The author reported eighty-three cases, treated with inhalations of ozone, which destroys the action of the bacillus of Bordet-Gengou.

J. Szymanski.

The Toxic Element in Goiter.

PERN, SYDNEY.

Med. J. Australia, Sydney, April 6, 1918.

Pern says that in thyroid hypertrophies certain toxins are present, and such hypertrophy can be reasonably looked upon as a defensive process or an attempt to eliminate or destroy such toxins. The type of goiter with hypothyroidism occurring in Gippsland, Victoria, is due to absence of lime salts in the soil. Pern selects thirty-five cases from his case books in which the treatment of pyorrhea, sinus suppuration and the removal of septic tonsils was followed by the cure of Graves' disease.

A. J. Brady.

The Treatment of Tumor of the Hypophysis, Especially Acromegalia.

DE CASTRO, ALOYSIO.

Brasil méd., Rio de Jan., 1917—415.

At a session of Academia Nacio nal de Medicina, the author calls attention to the surgical treatment of acromegalia in Brazil. He showed the superiority of the intranasal operation.

J. Szymanski.

Tumors of Hypophysis.

LEAL, JUNIOR.

Brazil méd., Rio de Jan., 1917—437.

The author claims that tumors of the hypophysis were not operated in Brazil until now, because almost no such patients are sent to the specialist.

J. Szymanski.

SOCIETY PROCEEDINGS.

THE NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of May 10, 1918.

Paper: Two Cases of Sinus Thrombosis Which Presented Unusual Difficulties in Diagnosis.*

E. Ross Faulkner, M. D.

Dr. Perkins asked what was the condition of the mastoid in the second case.

Dr. Faulkner said that it was just a sclerosed mastoid with no pus. The patient had had a chronic otitis media since childhood.

Dr. Perkins asked what was the condition of the mastoid in the second case.

Dr. Faulkner replied that it was just a stenosed mastoid. The patient had had a mastoid condition since childhood.

Dr. Perkins said that the fact that the patient had such intense frontal pain suggested a possible explanation. The point about the double rise in temperature was well worthy of consideration, but the terrific frontal pain with a process of that nature could only be accounted for by considering that the mastoid being sclerosed the inflammation extended to the petrous portion and disturbed the Gasserian ganglion. This trigeminal neuralgia is one of the symptoms that occurs in involvement of the petrous portion, at this associated with abducens paralysis. It seemed probable that the pus found its way toward the apex of the petrous portion rather than externally, on account of the hard mastoid. While we do not feel like operating upon such mastoids, they are among the most dangerous types of mastoid involvement. We have to deal with pus which cannot find its way externally, and the process goes on and involves the sinus or meninges, or perhaps the labyrinth. When we are asked to do a mastoid and find a hard bone, we are apt to feel disappointed, but we

*See page 970.

should not, as the result often justifies interference as in this case of Dr. Faulkner's.

Dr. Braun said that the cases were interesting as demonstrating the fact that one cannot depend altogether upon the blood culture in the diagnosis of sinus thrombosis. It is one of the most valuable aids we have, but it is not infallible. A negative blood culture is not of much value, but a positive culture gives much help. He said further that he had never seen a case of sinus thrombosis caused by the streptococcus viridans, and he did not think it was the causative organism in this instance, for Dr. Faulkner had found streptococcus hemolyticus in the pus from the region of the bulb. With streptococcus viridans in the blood and a valvular murmur, one can make a fairly certain diagnosis of septic endocarditis. The only way this particular case could be explained was that either no streptococci got into the circulation from the clot or else they were overpowered by the concomitant infection with streptococcus viridans.

Dr. J. G. Callison disagreed with Dr. Braun's position in regard to the value of the blood culture. There is sometimes a failure to properly interpret the findings of a blood culture in cases of sinus thrombosis. It is not a diagnostic procedure, but having made a diagnosis it is an important aid in prognosis. There are three stages or phases in sinus thrombosis: First, the forming of the blood clot, during which bacteria are swept off the surface of the clot by the blood current. Second, such a case will become negative later, when the vein is completely occluded and there is no flow of blood through it. Third, when the clot begins to break down and the pus is swept into the circulation, positive blood culture will result. In early sinus thrombosis a positive blood culture is indicative of the fact that the clot is not completely formed. Under these conditions the blood will sterilize itself, if the source of infection is removed. In the later case of a positive blood culture the bacteria are scattered through the blood stream continuously, the bactericidal substances in the blood are absorbed and the blood cannot sterilize itself. Then the prognosis is very bad.

Dr. Faulkner said that he agreed with the position held by Dr. Braun. He had suggested to Dr. Dwyer that the

culture may have been contaminated, but he refused to consider that possible. On the other hand, the patient's condition cleared up so rapidly after the sinus was opened that it seemed rather hard to account for the streptococcus viridans having been the cause of his symptoms.

The pain in the second case was a problem. The latter had been discussed with Dr. Richards, who said that he had sometimes noticed that putting in an applicator in the region of the bulb seemed to produce pain in the frontal region. There might have been a bony inflammation there and pain referred along the superficial petrosal nerve to the orbit. It did not seem very probable that it could be due to a fifth nerve reflex, although that was possible. It was so distinctly localized that it seemed like the pain from a frontal sinus affection.

Carcinoma of Auricle; Radium Treatment for Eighteen Months With Failure to Cure; Removed with Half of Auricle; Plastic Operation to Cover Defect.

TRUMAN LAURENCE SAUNDERS, M. D., AND

JAMES G. CALLISON, M. D.

DISCUSSION.

DR. GEORGE S. DIXON said that the notes on the radium treatment were incomplete, as part of the record had been lost; but the growth was absolutely healed repeatedly, and the surface as smooth as it could possibly be; but in a very short time—say within three weeks—it would break down again. While in one sense it was cured, in another the radium treatment was a failure, for healing is not a cure, if the condition recurs. While radium is useful in this form of growth, there must be a sufficient amount of substructure. Here there was nothing but cartilage. Quite a number of small epitheliomas have been cured with radium and have not recurred, though they are a rather difficult proposition always.

Report of Case of Labyrinthomeningitis with High Spinal Fluid Cell Count Following Radical Mastoid Operation.

DR. ALFRED KAHN said that he would make only a brief statement regarding this case, especially referring to the

spinal fluid count. He intends reporting the case more in detail in the fall. He was mentioning it now at the request of Dr. Perkins, because Dr. Perkins would refer to the case in the paper of the evening which was at the end of the program. He wished merely to state that the spinal cell count was extremely high. He did not remember the exact count. The count had been reported to him verbally at the time. The case was one of labyrinthine disease following a radical mastoid operation. Two or three days after the operation the patient developed labyrinthine symptoms (nystagmus toward the opposite side, dizziness, etc.). Then the labyrinth became dead and he developed meningitis. The labyrinth operation was not performed, and the patient recovered. Dr. Kahn said that he had hoped to present the patient at the meeting, but had not been able to get in touch with him.

As to the indications for doing the labyrinth operation, Dr. Kahn was of the opinion (regardless of the views of the Vienna school) that our knowledge of labyrinth disease conditions was so limited that no hard and fast rules could govern any case. Being face to face with a meningitis condition, such as we are now considering, we might in one instance perform the labyrinth operation, while on the other hand, in another consideration presenting very similar facts we might not feel justified in operating. In his opinion, with our present knowledge and experience, it does not yet seem possible that one can say firmly, definitely, when a case should be operated or not. The percentage of deaths, even considering those who are presumed to have the best labyrinth technic, is so high there is hardly a chance of recovery. Certainly he himself would not consent for a moment, having in mind our present knowledge, knowing the best operators and the character of the operation, under the most extreme condition, to undergo the labyrinth operation. This would be difficult, for example, of the mastoid operation, so you can judge as to his opinion in the matter. When one comes face to face with such a labyrinth meningitis condition such as we are considering, in his opinion it is rather a toss-up in most instances as to whether the operation should be performed or not. Certainly in the case which he is here reporting, it was thought that the patient would die with or

without the operation. The labyrinth operation was not performed. The patient made a complete recovery.

DR. BLACKWELL asked if there were organisms in the spinal fluid.

DR. KAHN said there were none.

DR. PERKINS said that Dr. Kahn's case, to which he had alluded in his paper, was somewhat of a surprise to him, as he had always held that leucocytosis of the spinal fluid during a labyrinthitis was an indication of a meningitis of a probably fatal nature, which nothing but prompt operation and drainage could save. He had treated several patients of that nature successfully, and had managed to save some, and had felt that he was to be congratulated on the result. Dr. Perkins said that he had not seen this patient, as it was a private case, but had heard of it; that the patient had labyrinthitis, was totally deaf, with nystagmus to the opposite side and vertigo, and that he had a leucocytosis of the spinal fluid of between 600 and 700, and he had supposed of course that the patient would die, but he did not.

Paper: Leucocytosis of the Spinal Fluid in the Diagnosis of Otitic Meningitis.*

CHARLES E. PERKINS, M. D.

DISCUSSION.

DR. KAHN said that a most important question is when is the proper time to do the labyrinth operation. Ought it to be done before meningitis develops, following the radical operation, followed in turn by labyrinthitis, followed by a dead labyrinth? If we operate before meningitis develops we run the chance of opening the subdural space and causing meningitis of an intense type with almost certain death. If we operate after meningitis develops, to follow the rule, we must first have a dead labyrinth. We may even have a high spinal cell count without a dead labyrinth. Following the rule, we should first wait until the labyrinth is dead before proceeding. It must be absolutely dead.

The statistics on the subject are very narrow. They have

*See page 974.

been gathered almost entirely by the Vienna school, based on operations which they, and they alone, have done. They are not based on all the recoveries. Look at the cases in the clinics with discharging ears over a long period of time associated with complete deafness. They are doubtless cases of labyrinth involvement which have not been treated and still have recovered. The statistics in regard to these cases have not been generally kept. The whole knowledge is based on insufficient data. It may be all well enough to discuss this condition and to outline the procedure, but when you come face to face with a case of labyrinth meningitis such as I have reported earlier in the evening, which has been referred to by Dr. Perkins, and your instinct tells you that the patient has an equal chance whether the operation is done or not, you are not in any mood to go ahead and do the labyrinth operation, with the very great chance of opening the subdural space and endangering the case further.

In the case to which Dr. Perkins referred, this point had been weighed carefully, and it was thought the patient would have a better chance if not operated upon, and he did recover. On the other hand, if the operation had been done, and the patient recovered, the credit of the recovery would have been given to the operation. What is one to say? The labyrinth operation is yet in its infancy. The slightest slip by the most skilled operator will result in death. The Richards operation is a tedious one, and the Neumann operation is a dangerous one. One should think carefully before submitting a patient who is apparently dying to such an operation.

Dr. Dixon expressed himself as in entire accord with Dr. Perkins' paper. It is known that the normal cell count of the spinal fluid may be about ten per cubic millimeter. When the cells increase, there is reason for suspicion. He believed the cells to be hemic in origin. When the pleocytosis increases there is added a difference in character and polynuclear cells appear. In inflammatory cases (speaking of meningitis and meningeal irritation), the fluid may become decidedly cloudy and the cells may reach several thousand per cubic millimeter. About the time the cells begin to increase the globulins appear, the glucose reaction decreases and finally disappears, and germs are found either in smear preparations or in cultures;

but even in this stage the patient may recover, provided the infectious germ is not streptococcus capsulatus. Dr. Dixon said that so far as his experience went, all of such cases have invariably been fatal.

He does not believe that one can make a diagnosis of purulent meningitis of otitic origin in its early stage by examination of the spinal fluid alone. One of the clearest cases he had ever known gave no indications of pleocytosis, and the patient died. At the autopsy, a purulent basilar meningitis was revealed; the upper part of the spinal canal was bathed in pus, but there it stopped. The canal was completely walled off, and the pus never got beyond that point. Doubtless the same thing could happen above. There seems to be no reason why a meningitis may not become circumscribed and entirely walled off. When the disease starts it may be simply a plastic exudate, and there is no reason why that exudate should not remain circumscribed, break down in the middle. and then increased cells not appear in the fluid until the wall breaks down and they have a chance to follow a path to the canal. In his experience, in the majority of cases, the increased pleocytosis is the best guide in the early stage, but this must be taken in connection with rise of temperature and a leucocytosis of 18,000 or more. A positive diagnosis of purulent meningitis cannot be safely made from the spinal fluid alone till the culture is positive.

Dr. J. G. Callison said that the attempt to make a positive diagnosis from the spinal fluid was a recent development in laboratory technic—almost within the last ten years. Before that time the pathologist disliked to see a spinal fluid specimen come into the laboratory, there was so little that could be done to aid in arriving at a correct diagnosis. The fact was noted whether the fluid was clear or cloudy, a culture was made, a stained smear of the sediment was examined and sometimes the tubercle bacilli were looked for. Later an attempt was made to arrive at a diagnosis of meningitis by the presence or absence of copper reduction. About the same time, or a little earlier, the Wassermann reaction on spinal fluid came into general use, and with it the test for the increased globulin content of the fluid. As late as 1910 there was no satisfactory method of making an accurate total cell

count of the spinal fluid, but since then several methods have been devised.

The colloidal gold test, now coming into general use, offers probably the most accurate and certainly a rapid method of making a diagnosis from the spinal fluid. As is well known, there are four type curves in the colloidal gold reaction, depending on the condition present. Of course, the most common of these type curves is that of normal or unchanged spinal fluid, in which there are no changes in any of the tubes of the test. I may say that the set up of a spinal fluid colloidal gold test consists of eleven tubes. In the first the spinal fluid is diluted to 1/10, and this dilution is doubled in each succeeding tube to the tenth, in which it is 1/5,120. There is no cerebrospinal fluid in the eleventh tube. Then comes the cerebrospinal syphilis form of curve, in which there is a rapid rise in the color change of the colloidal gold solution, reaching the maximum at the third to the fifth tube. This is succeeded by a rapid fall in the color reaction, reaching the color of the control at the sixth or eighth tube. A third type curve, not so common, is the paretic curve. This type shows complete decolorization of the colloidal gold solution, usually extending as far as the fourth, fifth or sixth tube. From this point on there is a rapid decline of the color change until the color of the control is reached. In the meningitic type there is no change in the colloidal gold test until about the sixth tube. Then there is a rapid rise in the color change of the colloidal gold solution, reaching the maximum just before the end of the set up. This type of reaction is given in all those conditions where there is no marked increase in globulins. This is characteristic of inflammatory spinal fluids. When it is worked out in early spinal meningitic cases—early otitic cases, one might say, for there the majority of meningitic cases occur—it would seem to be a very promising method. It is certainly desirable to make an early accurate diagnosis from the spinal fluid. The colloidal gold reaction can be read with a fair degree of accuracy after it has been set aside for twenty minutes. While the usual time for making the reading is after four hours, the reading can safely be postponed for twenty-four hours.

In regard to the cell count, it seems doubtful whether or

not the differential count is of value. The total count certainly is of value, and it is from this that diagnosis is made in most cases. In syphilis and tuberculosis the total count is usually not over 300 cells per cubic millimeter, but may rarely go to 500. These cells are lymphocytes and endothelial cells. The count in acute inflammatory conditions is anywhere from the normal, less than ten, to many thousand cells per cubic millimeter. These cells are, of course, polymorphonuclear leucocytes. In inflammatory conditions the count is usually so high before the fluid is examined that there is no question of what the condition is. If you get a count of 300 cells per cubic millimeter with any symptoms of acute meningitis, it may positively be considered that an inflammatory reaction is present. A question which the laboratory can never settle from the spinal fluid is whether the condition is of toxic origin or whether there is a direct bacterial invasion. An exact and final prognosis from the spinal fluid is, therefore, impossible, but from the diagnostic standpoint the prospect is very hopeful.

Dr. Kahn said that it is very important in all radical cases to have a spinal fluid count made before operation, so that after operation, if there is a change in the count, etc., in any subsequent after operation he is in a position to immediately recognize it. This primary test increases the value of any subsequent test; as in certain chronic diseases, like syphilis, etc., a change may take place in the fluid different from what is usually considered normal.

Dr. Perkins said that he had had this paper in mind for some time, and had hoped to hear from some otologists who had said to him that they never made a total cell count, and he would like to know how they came to their conclusions.

Referring to globulins in the spinal fluid, Dr. Perkins said they had had one patient at St. Luke's, who had a positive globulin test from extradural abscess. In extradural abscess it was found that without any increase in the leucocytes the report on the butyric acid test was positive, it was thus shown that the globulins can escape through without the leucocytes.

The Fehling had proved very unsatisfactory. In the cases that got well it was invariably negative. If the test is positive, it is really negative for our purposes. If sugar is reduced

by Fehling's test, it is negative so far as spinal fluid is concerned. If the sugar is not reduced by the Fehling test, the patients were in a later stage of the disease, and they all died. It is absolutely of no help in the early stages. These early cases have been considered meningeal irritation because bacteria were not found. The Fehling test has reduced the sugar.

About microorganisms in the spinal fluid, Dr. Perkins said he thought that point had been very well covered. The finding of microorganisms is of very little value to the otologist who is trying to save a patient developing meningitis; twenty-four hours is a very long time—too long to wait if operative interference is going to avail. Even in the late stages the best treatuent, so far as surgical measures go, is to remove the area of infection. If the inflammation is from a sinus thrombosis at the inner wall or from an extradural abscess, or from the labyrinth, remove that. Catch the process while it is still walled off in the internal meatus.

In regard to the matter of labyrinthectomy, Dr. Perkins said that he had never posed as an authority upon labyrinthectomy and was still seeking light himself. It is a fact, however, that quite a number of purulent labyrinthitis cases pass into a latent stage, and very likely the labyrinth is filled up with new bone or fibrous tissue and the patients get well. The reports of many cases of deafmutes read very like the reports following latent purulent labyrinthitis. If it was known which patients would develop this latency, it would be the height of folly to operate; but the mortality from the labyrinth operation before the meninges are involved should not be so high as it is. The idea of the chisel slipping and doing great damage is not a point to be considered. The surgeon should be able to do the operation, and there should be no accident if he has perfected his technic. The operation should not be a dangerous one to anyone who is willing to spare the time to perfect his technic. The operation is not performed so frequently as it should be; when there has been an acute labyrinthitis that has destroyed every function of the inner ear and there is no reaction to the caloric test, and there is total deafness, and a leucocytosis in the spinal fluid—that surely is waiting long enough. As long as there is a response

to any reaction it may be called a serous labyrinthitis and operation is not indicated. Dr. Perkins said that he appreciates the difficulty of testing the labyrinth when there is a nystagmus to the opposite side.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of November, 1917.

Radiographs in Acute and Subacute Mastoiditis.

Dr. Harris said he wanted to refer to the ever recurring question of the diagnosis, or rather the treatment of acute mastoiditis. It was a question they were always discussing, and he had recently read a paper by Dr. Dench on the indications for it. The speaker said he had seen recently two or more cases, where the old textbook definitions were entirely lacking. He did not think that in this gathering any of them would fall down on these cases, but there was still a pretty widespread idea that the classical symptoms must be present, namely, the pain referred to the mastoid, usually subjective, pain at least, if not subjective obtained by pressure, and sagging of the superior posterior wall.

Dr. Harris said the reason of this discussion was especially in reference to what experience the members of the society had had in the use of X-ray pictures. His first case was a man who had gone three weeks with an acute ear and who had had repeated paracenteses (he thought this had been performed three times). There was no pain, no sagging of the superior posterior wall, no symptoms whatever, except a continued suppuration, which was not excessive. The man was very decidedly deaf in one ear, however. The X-ray picture showed almost complete obliteration of the mastoid cells and the operation confirmed everything the picture had shown.

The second case had lasted almost the same time, possibly a few days longer. The day before Dr. Harris saw the man he had a little pain, but up to that time no pain whatever. Neither of the cases had had a blood count examination, and the second case had no preliminary examination until the discharge in the ear. The second case showed the same complete destruction, the same involvement, all that with pus and granulations the first case had.

Dr. Harris said that ten or fifteen years ago he would have been rather puzzled with these cases in making a decision

to operate. He should have felt certain that he would not have been warranted in doing so without consultation. He said he was interested in whether any of the gentlemen were making use, in a routine way, of X-ray pictures, whether they were having a roentgenogram of every one of their cases or only in cases where they were in doubt, as in the cases he had narrarted, and how much value the pictures were giving them today.

Dr. Harris said his cases showed absolutely nothing at all. The ear would not stop discharging, or stopped and then went on. The one man had been seen by one of the best New York men, who did the paracenteses. The second man had had no blood examination, neither any temperature, but he was operated on the same day.

Dr. Kerrison, in discussing these cases, said he would like to know if anyone present considered an X-ray picture necessary in every case. In the clinics, for example, this would be an immensely expensive procedure, and surely in a majority of cases the diagnosis may be made upon clinical symptoms alone. Purely as a matter of interest and not bearing on the question under discussion, it might be interesting to mention a case which came under his care. This patient, a woman, came to the hospital clinic about a year ago, with an acute middle ear suppuration. Within two days of the onset symptoms of diffuse suppurative labyrinthitis were present. She was admitted to the ward for observation and treatment, which consisted chiefly in keeping her as quiet as possible in bed, with, of course, the necessary cleansing of the ear. Dr. Kerrison was called away from the city some five days after her admission, and was surprised on his return to learn that the patient had insisted on leaving the hospital. This, of course, indicates that the symptoms of vestibular irritation had very largely subsided. When she next appeared at the hospital clinic there was no nystagmus, but the ear was still discharging and the patient was absolutely deaf in the involved ear. She was now sent to the hospital laboratory for an X-ray picture which gave a perfectly definite indication of involvement of all the mastoid cells on the diseased side. The patient, however, refused to return to the ward. Very shortly after this she went to Baltimore, where she came under treatment at the

Johns Hopkins clinic, where a very exhaustive study was made of her case. When later she returned to New York the drum membrane appeared absolutely normal, she had no pain, she was apparently in good health, able to attend to work of some importance, the only remaining symptom being absolute unilateral deafness.

DR. DENCH said he would like to ask Dr. Kerrison about this woman's labyrinth. He asked how this woman's temperature was running, if it ever reached 100 or 102 degrees, and whether she had had any nystagmus.

DR. KERRISON said the woman's temperature never went over 102 degrees. The main symptoms had been nystagmus and absolute deafness, of course with the usual phenomena of disturbed equilibrium.

DR. HARRIS said they had all come to a clear conception of what we would do on the third, fourth, or fifth day, with the clear cut mastoid symptoms, pain, sagging of the wall and discharge, but he asked what rule we were going to make in regard to our cases, which did not heal, as far as the discharge was concerned, at the end of the second or third week, and yet were without pain and the discharge not profuse. Were we accepting the position that a good many men had laid down, that if one did not get drainage through the auditory canal one must get drainage behind the ear. He asked was that simply a textbook statement or were we coming to that position without discussion.

DR. PHILLIPS said they should not permit the fact that there are atypical cases of mastoiditis to disturb their well founded convictions regarding the classical symptoms of the typical cases. We know just what to do for the typical cases, but the atypical cases require good judgment. To Dr. Phillips' mind that was where the radiograph gave stronger help than it did in the typical cases. No man should say that he did not consider a radiograph a very great help, but at the same time he did not think it necessary to have a radiograph made in every case. The radiograph should hold the position of confirmatory evidence. It was a very valuable adjunct and one they should certainly rely upon for purposes of verifying the diagnosis, and especially in these atypical cases. There were several reasons. It tended to tell one how extensive the

disease was, whether one had a large or small mastoid, the location and anatomic outlines of the lateral sinus, and further, the X-ray had an additional value in that it portrayed the pathologic changes in a most convincing manner.

A further point Dr. Phillips said, which Dr. Harris had brought out, led him to make a suggestion based upon very careful observation in a large number of cases with persistent discharge, in the second, third or fourth weeks, the pus continuously pouring out, there was nothing to do but operate. Dr. Harris had said his patient had had no temperatures. Dr. Phillips had been told this by patients and family physician time after time, but after he had put such patients in the hospital he had found some temperature. He regarded this as one of the most significant symptoms in delayed cases. It was his custom wherever an otorrhea persisted into the third week, with even a slight daily rise in temperature, even if it did not show the typical signs, and might not have tenderness or drooping of the posterior canal, to seriously consider operating. If these cases were verified by a radiograph, one had then very valuable evidence.

DR. LUTZ said, as Dr. Phillips had stated, that he had seen several such cases. He believed they got a faulty history very frequently from the family physician who sent these patients, assuring them that the patient never had any temperature. Dr. Lutz had put such cases under observation and regularly found a temperature. He said it might not be more than 99½ or even 100 degrees.

He thought the X-ray was a valuable help in cases of this kind, because the temperature alone was not the cardinal symptom. The clinical picture may convince the otologist that an operation is needed, but he has to be fortified at times by outside means in the position he has taken

DR. HARRIS asked Dr. Lutz if he thought the X-ray was of any value, except for moral effect.

DR. LUTZ said the value of the X-ray depended a great deal upon who took the picture. He had seen plates that did not tell him a definite thing, and other plates that really astonished him, in which he did not believe the disease so extensive as the plate showed.

DR. KERRISON suggested that the concensus of opinion could be very well stated by saying that the X-ray is useful in doubtful cases.

DR. LUTZ said he did not believe it necessary to take a picture in every case, because they saw so many cases where they had not the faintest suspicion of doubt but that the patient should be operated. He said if one had a doubtful case and a doubting family or consultant, a picture by a man who knew how to take one would be a great deal of value.

DR. DENCH said he was very glad to be asked to speak on this subject, in which he was very much interested, and he had considerable experience in reading them at St. Luke's Hospital. They had X-rays taken of every case where there was the least doubt in an ear that was not going to clear up; moreover, in a great many cases, especially occurring before the war, and they had often made them in every case of acute otitis media. Examination and comparison of a large number of X-ray plates, and plates taken at different intervals of the same patient, where they were not able to interpret what in a doubtful case the picture meant. In any case of acute otitis media after forty-eight hours they would find that the walls were indistinct. If they had an X-ray of that case going on to recovery, taken a week later, they would find that the plate would coincide with the clinical symptoms. Where one had infiltration that part of the plate would become white, then the walls would become more distinct, until one got just a little whitening close to the antrum, and then the whitening existed for a considerable length of time. They had other cases where the mastoid were better opened, and in a certain number these cases healed spontaneously and healed by sclerosis. In a certain number of cases, which Dr. Dench had reported, he had a series of plates taken, and after the first plates they were frequently operative on the eighth or ninth day, and in the absence of any symptoms it would have been foolish to operate, because of the plate before that time. Sometimes on the twelfth or fifteen day, the patient would still be doing well, and it looked better at the end of two weeks, and then the whole thing would stay cloudy and that might be sclerosis. The value of a series of X-ray plates is that it would help one to read plates accurately.

With reference to the remarks of Dr. Kerrison's case, of which he would like to hear the report, it struck Dr. Dench that he had seen the same condition in perilabyrinthitis in a man where they could not wait for the perilabyrinthitis to clear up. The man was absolutely deaf, except for loud sounds, and now he heard as well as he did prior to the attack. He showed exactly the same symptoms as Dr. Kerrison's case.

Dr. Dench said that roughly a picture would be most valuable about the fifteenth day. He operated on a nurse, in which the X-ray did not show anything, but he operated. Another point was, not only who made the X-ray, but who read the X-ray. He had seen X-rays which other men said were excellent, but he did not see anything in them. He got accustomed to reading plates by a certain man, and thought this man's plates better than any other man's, just because he got accustomed to reading them. Dr. Dench thought the whole point depended on the plate being read by the man who was accustomed to read these particular plates made by one radiographer. He thought they would learn a great deal more by simply following these cases up and have X-rays made in various stages than if simply confined to uncertain cases. A patient had come to Dr. Dench six weeks previously with an obscure history, in which he could not tell whether it was a furunculosis or acute otitis media. There were two or three little warty spots in the canal, and the drum membrane looked dull. The case history showed that the patient several years ago had a socalled mastoiditis and had just escaped operation and was taken care of by a very excellent man. Dr. Dench took the patient down to a certain radiographer and they both looked at the plate, and this man said it was not an operative case, and subsequently it cleared perfectly. He saw the case twelve days after inception of the acute condition, with a history of socalled mastoiditis several years before.

To show how very valuable this was, when the work was a great deal younger, seven or eight years ago, this certain radiographer enabled Dr. Dench to pick out little areas of softening and he found them absolutely so located at operation. For that reason he believed the X-ray was of the greatest possible advantage and would enable them to clear up doubtful cases. Whether he would operate on the X-ray

alone, he could not say. He said he had never seen any cases that did not show in addition to the X-ray some symptoms, some haziness of the drum membrane, some temperature or narrowing of the canal. He did not think 99½ degrees a temperature, and if all the men had temperatures taken they might go over 99 at some time during the twenty-four hours.

DR. PHILLIPS said they were doing an enormous amount of X-ray work at the Manhattan Eye, Ear and Throat Hospital, and it was a daily occurrence, though probably not so frequent at the present time, because of the expense.

DR. DENCH said that he thought the use of the X-ray picture, simply to impress upon the family physician the necessity for operation, was wrong and savored of quackery. Many of these men would not have even the slightest conception of the meaning of the plate.

DR. LUTZ thought the plate made a lot of difference in convincing the patient that he needed a mastoid operation. The patient frequently appreciated the opinion of his family physician very much more than a man he has seen only two or three times. The picture would show what the patient could not be made to understand by talking with him. Dr. Lutz found that it was sometimes harder to convince the family physician that an operation was needed than it was to satisfy the patient. For all these purposes a plate was a help where everything else failed.

DR. HARRIS said he raised this question not because he had ony concern that the gentlemen differed in their views, but because of the fact that a man who is doing a great deal of operating and is connected with two hospitals seemed to think that the use of the X-ray was a very rare and unusual thing. Dr. Harris said the gentlemen present had stated his views very decidedly. The X-ray was to him invaluable, of the greatest help in doubtful cases, and while he never would forget that they must emphasize the clinical findings, yet to have the apparent disregard that a good many men were still showing to such a valuable help in diagnosis surprised him, and he wanted this society to go on record that they were getting benefits in these doubtful cases. It was of course understood that these pictures must be good pictures. He thought those in our special hospitals were good pictures. He should be

very sorry indeed to see the X-ray taken away for the help in these doubtful cases, and he felt that what had been said should receive publicity at some time or other.

Mastoiditis With Staphylococcus in Pure Culture.

DR. PHILLIPS said he would like to emphasize a point made in connection with some cases that he had reported last winter, where the infecting organism in a number of mastoid cases was staphylococcus in pure culture. He had not the figures of the cases of mastoiditis in private and hospital practice, but a considerable proportion of these cases showed the infecting organism to be the staphylococcus. He had a series of these cases and reported two before the society, and he said the chairman had then stated that cases of that kind had not come under his notice. Dr. Phillips inquired whether such cases had turned up since at other institutions. Dr. Dwyer had gone very carefully into a study of these cases with him and the cultures had been made in all cases.

DR. DENCH said he could not answer for any such cases, and he had gone into the matter very carefully. He had reports of staphylococcus coming back to him, and they always turned out streptococcus or pneumococcus. He had had only one such true case, and had forgotten whether it was albus or aureus. He also had such cases at St. Luke's Hospital, with a report of staphylococcus, and when he sent them back to the laboratory again they changed into something else.

DR. PHILLIPS said they ran their cases through pure culture in every case, and he would bring this matter out with Dr. Dwyer. Dr. Duel had also had such a case, which was fatal.

Discharging Ear and Dizziness Complicated With Syphilis.

DR. LUTZ said he wanted to mention a case he had seen some time in June, a patient from the Brooklyn Eye and Ear Hospital, having pain in his ear and complaining mostly about dizziness. When Dr. Lutz saw him he urged him to stay in the hospital. He came in that night, went out the next day and then came back to the clinic. He was more dizzy and his mastoid pain was worse. The ear was discharging profusely. Dr. Lutz did not see him the second time, but the assistant surgeon in the clinic urged the patient to come back to the

hospital and be operated on, but he got away. They did not know anything about him for nearly three weeks. Dr. Lutz was then asked to go to the Bushwick Hospital to see a man who had been operated upon, and it proved to be this patient, but he was still dizzy. After he had been taken into the Bushwick Hospital he showed a four plus Wassermann reaction, but they did not get the record until after the operation. Dr. Lutz wondered if that dizziness might not have been due to syphilis. They did not do any further operation, but the patient got perfectly well after being put on antisyphilitic treatment. When he first appeared in the clinic he seemed to have an acute labyrinthine involvement from his mastoid involvement.

Dr. Phillips said it was very fair to assume that so far as the labyrinth condition was concerned, it was due to syphilis.

Dr. Lutz said he wondered in one of the cases Dr. Kerrison had, whether that case had been specific and his hearing had improved after treatment. He said he thought it was probable that where the hearing had gone and afterward returned this was a possibility.

Examination of Army Aviators.

Dr. Kerrison related the interesting findings in the case of an applicant for the army aviation corps, who came before him for examination. This was a young American, twenty-two years of age, who had always enjoyed excellent health. He had also been something of an athlete as a short distance runner. Dr. Kerrison's examination was solely in regard to his static labyrinth. After the prescribed method he was rotated ten times in twenty seconds—first to the right and then to the left. There was absolutely no nystagmus after rotation in either direction. He was then rotated ten times in ten seconds—first in one direction and then in another, following which the man pointed with absolute accuracy—that is to say, he showed no past pointing—and there was still no nystagmus. To carry this test still further the man was again rotated ten times in ten seconds and directed immediately to stand with eyes closed in the Rhomberg position. This position he was able to maintain without any difficulty. According to army regulations this man would be rejected for the service, yet one

would think that he might prove a particularly fit subject for aviation work.

DR. DENCH asked if this man who was examined for the aviation corps had ever had cerebrospinal meningitis.

DR. KERRISON said, in answer to Dr. Dench, that this man had never had cerebrospinal meningitis. He had never suffered any disturbance of equilibrium which led him to think that his static mechanism was in any way at fault.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of March 19, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

PRESENTATION OF CASES.

DR. JOSEPH C. BECK exhibited a number of patients showing the results of plastic operations about the head and neck.

A New Tuning Fork Nomenclature.

A. H. ANDREWS, M. D.

C1	C2	C3	C4	C5	C6	C7	C8	C9
16	32	64	128	256	512	1024	2048	4496
D1	D2	D3	D4	D5	D6	D7	D8	D9
18	36	72	144	288	576	1152	2304	4608
E1	E2	E3	E4	E5	E6	E7	E8	E9
20	40	80	160	320	640	1280	2560	5120
F1	F2	F3	F4	F5	F6	F7	F8	F9
21	42	85	170	341	682	1365	2710	5421
G1	G2	G3	G4	G5	G6	G7	G8	G9
24	48	96	192	384	768	1536	3072	6144
A1	A2	A3	A4	A5	A6	A7	A8	A9
27	53	106	213	426	853	1706	3412	6826
B1	B2	B3	B4	B5	B6	B7	B8	B9
30	60	120	240	480	960	1920	3840	7680

The present plan of designating tuning forks for otologic work is unsystematic and confusing. It uses algebraic terms without algebraic significance. In the development of the plan it began in the middle and worked both ways. Otologists have long recognized the desirability of a better plan, but the origin of the present plan and the traditions surrounding it have seemed to prevent the serious consideration of any change. The present time seems propitious for American otologists to do things to suit themselves.

The new system suggested is to begin with the lowest C fork and designate the first octave with the number "1" following the letter. Each successive octave is designated by the number following each letter in the octave. While this is not offered as the best possible system, it has the advantage of simplicity and clearness.

DR. JOSEPH C. BECK spoke on the subject of

Plastic Operations About the Head and Neck.

and showed a series of lantern slides demonstrating many of the operations which he had performed.

He said the purpose of this talk was in line with what we might be called upon to do as the result of our entrance into the great struggle, the work of plastic surgery of major form. Not that which is required so frequently in otology and laryngology, but in the destruction of the greater part of the face, the external ear or nose, and other parts about the head and neck. The work has already been well established for men who have been at the front where they have been exposed to missiles. There would be plenty of work for everybody to do in this line, and it was for that reason that he wished to present the subject. It was not to show any brilliant results, for a corrected deformity was anything but beautiful, but the patient who sustained an injury to the external nose or ear was most gratified when it was corrected, even though not perfect. He had yet to see a single patient whom he had operated for external deformity of any magnitude that had attempted to sue for damages. They were invariably proud of their condition and very grateful. There was scarcely ever a patient but what came from the poorer class of people. They were mostly charity patients with no means of pay for the work that was required, and it took a great deal of work on the part of both the patient and the doctor to get anything like the desired results.

The pictures were those of a number of operations which were being followed and showed the operations which he was teaching the men in the service who would go out to do this work. He was very proud of the results obtained by some of the men who had already gone over and were doing the work he had taught them in courses in St. Louis and Chicago.

LEGENDS OF ILLUSTRATIONS.

Slide 1.—Partial destruction of the nose, corrected with Wolfe graft, septal mucoperichondrium and cartilage reconstruction. (Eight illustrations.)

Slide 2.—Subtotal loss of the nose (eight illustrations). Corrected by transplantation of little finger.

Slide 3.—Loss of ala, corrected by pedicle cheek flap (three illustrations). Collapsed ala stiffened by cartilage transplant (two illustrations). Bony costal cartilage transplant (two illustrations).

Slide 4.—Italian plastic from arm to nose and finger support (four illustrations). Hindoo method, from forehead to nose (four illustrations).

Slide 5.—Temporary and permanent resection of the upper jaw (seven illustrations).

Slide 6.—Loss of upper jaw, including the lower eyelid and skin of the face, reconstructed by tunnel flap (three illustrations). Loss of right upper and lower lip and part of chin, reconstructed by double flap (two illustrations). Combining the tibia bone graft (two illustrations).

Slide 7.—Compound comminuted fracture of the lower jaw (eight illustrations), showing the involvement of the fragments; interposition of bone transplant; suturing the draining; wiring the teeth and emobilization of the jaw.

Slide 8.—Partial and total loss of external ear, showing tunnel flap and temple flap reconstruction of auricle (eight illustrations).

Slide 9.—Tracheotomy and laryngectomy (four illustrations).

Slide 10.—Laryngostomy (eight illustrations).

Slide 11.—Laryngoesophageal plastic with cartilage transplant (two illustrations). Laryngectomy (five illustrations).

Slide 12.—Complete loss of cartilaginous portion of the nose (two illustrations). Partial loss of ala, skin and cartilage (two illustrations). Partial loss of ala and skin, including part of the cheek (one illustration). Marked fistula with loss of cartilage substance of ala (one illustration). Complete loss of cartilage of nose, including columella (one illustration).

Slide 13.—Complete loss of bone and cartilage as well as dermal portion of external nose (two slides, sixteen illustrations).

Slide 14.—Complete loss of cartilaginous portion of the nose with marked cicatrization, involving the upper lip, corrected by artificial nose (four illustrations). Complete loss of bony and cartilaginous portion of the nose. Skin preserved (one illustration). Complete loss of cartilaginous portion of nose and marked retraction (two illustrations). Extreme saddle nose (one illustration).

Slide 15.—Complete loss of columella and destruction of cartilage following paraffin injection (four illustrations). Congenital luetic destruction of the entire external nose in otherwise healthy family (one illustration). Kink saddle nose (one illustration). Plan saddle nose (one illustration). Destruction of columella and ala, cicatrization (one illustration).

Slide 16.—Destruction from burn, both alæ, both external ears, both lips, both cheeks and neck, with marked ectropia and retraction, especially of lower lip (eight illustrations). Including the operation by Italian method, also showing plaster cast.

Slide 17.—Loss of columella, cicatricial contraction, Roberts' operation, phalanx transplantation, reformation of nostrils (eight illustrations).

Slide 18.—Fracture of external nose with cartilaginous transplantation (four illustrations). Tubercular destruction of columella (two illustrations). Destruction of ala by electricity, corrected by Italian double transplantation method (two illustrations).

Slide 19.—Fracture of cartilage and bony portion of nose, corrected by fat transplant (four illustrations).

Slide 20.—Traumatic saddle nose, corrected by rib transplant (four illustrations). Saddle nose from hematoma of septum, corrected by fascia lata transplant (four illustrations).

Slide 21.—Traumatic saddle nose, rib transplant with infection (three illustrations). Baseball saddle nose, rib transplant (three illustrations).

Slide 22.—Kink saddle nose, corrected by costal cartilage transplant (five illustrations). Congenital absence of septal cartilage, corrected by costal cartilage transplant, including external support (three illustrations).

Slide 23.—Mild saddle nose, tibial graft transplant. Saddle nose following hematoma opened externally. Corrected by costal cartilage transplant from mother to child (four illustrations).

Slide 24.—Traumatic saddle nose, corrected by costal cartilage transplant. Held in position by nasal saddle fixation (four illustrations).

Slide 25.—Mild saddle nose, corrected by paraffin injection in the year 1898 (six illustrations).

Slide 26.—Hump nose, corrected by intranasal method (four illustrations—two illustrations of external method and two of combined external and intranasal method).

Slide 27.—Traumatic saddle nose and fracture of the lower margins of the orbits with fistula, corrected by costal cartilage and facial plastic (four illustrations). Compound fracture of the nasal bones, supramaxillary and lacrimal, with tearing of the muscles by means of traction pulley. Corrected by plastic of the muscles and fixation of the fragments, tendon resection of tear duct, and fat transplant (three illustrations).

Slide 28.—Carcinoma of the external nose, destroyed by Percy cautery, and plastic reconstruction from facial flaps (four illustrations). Rhinophyma (two illustrations). Rhinophyma decorticated (one illustration). Epithelioma of the external nose (one illustration).

Slide 29.—External frontal sinus wall destruction with fistula (one illustration). Same condition corrected with fat transplant in the sinus (one illustration). Author's osteoplastic flap frontal sinus operation (one illustration). Multiple operation on frontal sinus with marked deformity (one illustration). Cerebral hernia, corrected from father to son, fascia lata (one illustration). Cerebral hernia uncorrected (one illustration). Cerebral hernia fascia lata transplant (one illustration).

Slide 30.—A dentigerous cyst resected and osteoplastic flap of alveolar process obliterating it (three illustrations). Oral antral fistula corrected with alveolar plastic (one illustration). Resection

of the upper jaw for carcinoma, twelve years ago, corrected by prothesis.

Slide 31.—External double hare-lip and cleft palate, corrected by Lane-Ferguson method (four illustrations). Adult cleft palate, corrected by author's trap-door plastic and inferior turbinated obdurator transplant (two illustrations). Luetic adhesion of soft palate and posterior wall of pharynx kept apart by transplant of posterior pillar and tonsil (one illustration). Ala deformity from hare-lip and cleft palate partially closed by inferior turbinated transplant (eight illustrations).

Slide 32.—Laryngotracheal fistula, laryngostomy, closed by author's trap-door plastic (two illustrations). Laryngotracheal fistula, laryngostomy, five attempts at closure (three illustrations, one illustration showing hand and toe union with toe transplant to larynx.) Unsuccessful. Skin and clavicular transplant, successful. Laryngotracheal fissure and laryngostomy closed by author's trap-door method. Growth of hair within the trachea from transplant. This removed under suspension.

Slide 33.—Prolapsed esophagus following chondromalacia post-diphtheritic. Laryngostomy, specially devised tube to prevent contraction of esophagus into the larynx (three illustrations). Laryngostomy with subhyoid fissure after artificial larynx implantation (two illustrations). Author's hard nasal clamp (one illustration). Max Joseph's orthopedic retainer (one illustration). Author's wire mask in a case of septal perforation, closed by middle turbinate autoplastic. (Transplant from one patient to another.) Mask used to prevent nose being touched.

Slide 34.—Facial paralysis, central origin (one illustration). Facial paralysis, congenital. Facial paralysis from extreme traction on the cheek in antrum operation. Congenital facial paralysis corrected by author's wire ceton method. Facial paralysis following application of trichloracetic acid to eustachian tube. Facial paralysis following removal of polyp in ear. Facial paralysis secondary to radical mastoid operation in which the entire tip of the mastoid was removed.

Slide 35.—Facial hypoglossal anastomosis with tongue retaining function two weeks after operation (two illustrations). Facial hypoglossal anastomosis with herpes along the course of the facial nerve (two illustrations). Facial paralysis traumatic. Following pitchfork thrust into external canal, grazing facial nerve canal in mastoid. Simple mastoid operation, recovery (two illustrations). Facial paralysis, dead labyrinth. Radical mastoid, including the exenteration, recovery (two illustrations).

Slide 36.—Severe trauma of face, scalping with fracture of nasal bones and superior maxillae in woman aged 62 years. Immediate repair (two illustrations). Traumatic absence of external ear (two illustrations). Faulty union after operation for ankylosis of lower jaw (one illustration). Ankylosis of lower jaw relieved by masseter implantation between two fragments of the ramus. Author's method. Resection of large neuroma in the parotid region, closed. Cavity filled up by fat and closed by sliding flap (two illustrations).

Slide 37.—Large retroauricular cavity closed by Author's trap door and sliding osteo-periosteal skin double pedicle flap (two

illustrations). Retroauricular post operative mastoid fistula communicating with external auditory canal. Closed the same way (two illustrations). Retroauricular postoperative mastoid fistula communicating with external auditory canal (two illustrations).

Slide 38.—Giant ear (two illustrations). Congenital lop ears (two illustrations). Same condition with partial facial palsy in two brothers (one illustration). Practically total congenital absence of external ear, three cases (one illustration).

Slide 39.—Post traumatic destruction of the greater portion of the external ear with scar on the face and side of scalp. Corrected by flap transplant from scalp, including the hair. The hair removed by electrolysis (five illustrations).

Slide 40.—Tubercular destruction of the external ear, including canal, thoroughly destroyed and artificial ear supplied (three illustrations).

Slide 41.—Lymph angioma treated with radium, 75 mlgrs. pure. This without marked benefit. Removed tumor and anchored part of the masseter in the upper lip (seven illustrations).

Slide 42.—Malignant hemorrhagic angioma treated at five different areas. Eyelid, radium 15 mlgrs. pure. Boiling water injected into the cheek. Freezing with carbon dioxide (snow) into the region of the forehead and temple. X-ray and diathermia to upper and lower lips. Parotid region subcutaneous ligation, with complete destruction of the angioma (four illustrations).

DISCUSSION.

DR. FRANK ALLPORT asked how Dr. Beck felt in regard to the average curability of facial paralysis.

DR. J. HOLINGER asked whether in radical mastoid operations with the large opening behind the ear, Dr. Beck would under all circumstances advise closing? He had operated quite a large number of cases in that way, before the more modern ways were known—i. e., before 1902 or 1903, and had never heard any complaint from the patients. Furthermore, there was sometimes a niche in the bone immediately behind the entrance of the external canal, which could not be controlled from the external canal, where large masses of epithelioma and secretions might gather later on and cause trouble. He now had a patient in whom he closed the opening behind the ear at the operation and he wished he had not. The cells extended far upward and backward, leaving now a deep epidermized pocket which causes trouble regularly twice a year. He would not condemn the perpetual opening behind the ear under all circumstances.

DR. CARL WAGNER stated that he had attended the meeting instigated by the feeling that he would learn a great deal from

Dr. Beck, whom he had watched develop from a boy. He felt that several things of great interest came out in the paper. It had been his privilege to watch the greatest plastic surgeon of his time, Dr. Nicholas Senn, for fifteen years, and was positive that during that time they saw hundreds and hundreds of the most wonderful achievements in plastic surgery for his time, but tonight they had seen brilliancy which he had never expected to see in his time in the presentation of Dr. Beck's patients and slides. He hoped they would go out through the United States and the whole world in behalf of those who were suffering. He was positive that if Professor Senn were living he would be glad to pay homage to Dr. Beck.

DR. BECK, closing, thanked Dr. Wagner for his complimentary remarks and said that in a paper presented before the Chicago Odontological Society he had spoken of Dr. Senn as his teacher in this work. It was his privilege to dress some of Dr. Senn's cases, and he learned a great deal in that way. He was proud to say that he once received a slap from Prof. Senn for making a mistake in dressing a case. Prof. Senn was always teaching the principles of plastic surgery and would untie a stitch two or three times in order to get it just right, so there was no tension. In his papers he brought out the points of how plastic surgery should be done.

Replying to Dr. Allport's question as to how many cases of facial paralysis were cured by anastomosis, Dr. Beck stated that he had operated fifteen cases. Of these three had made perfect recoveries, four of the other cases were all right when in a position of repose, but when they laughed they pulled the skin of the face to the side. The rest of the cases were absolute failures, which he attributed to the fact that he operated upon them without taking into consideration the reaction of degeneration. They were early cases that were operated when he wished to do the operation and learn how to perfect it and the cases were not properly selected.

He thought Dr. Holinger's question was not well taken. He was sure the majority of the men would not wish to go back to the foul smelling open operation. The X-ray revealed the condition before the operation, and Dr. Shambaugh had shown splendid cases two years ago, showing the dis-

tribution of cells. With a good plastic operation which exposed the parts thoroughly there was nothing to fear. In the cases he had shown they simply brought the two layers of the skin together, and there was nothing that had to do with the mastoid process. They were cases which were absolutely healed. If there was a large opening left behind it was due to faulty technic or that the skin was bad.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of April 16, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

Paper: Benign Neoplasm of the Nasal Septum.*

G. W. MOSHER, M. D.

DISCUSSION.

DR. ANDREWS did not think the growths were very common, as was indicated by the author of the paper. He remembered but one in his practice and that was a papilloma, which grew from the upper part of the septum well forward. He removed it once and it recurred, and after removing it a second time it did not recur again. Two years had passed since the last removal.

DR. GEORGE E. SHAMBAUGH stated that he has had under observation for several years a case of benign tumor in the nose, which springs from the ala of the nose at about the region of the limen nasi, which is the junction between the skin and the mucous membrane. The tumor was a papilloma, with rather a broad base. He had dissected out a large part of it at different times, but it had always recurred. There was nothing malignant in the growth, however.

DR. GOOD had a physican who presented a papilloma of the septum with a wide base. The tumor itself was about three-fourths of an inch up and down and one-half inch anteroposterior. He did a resection of the tumor, removed the cartilage under it and it did not recur. It was on the anterior inferior portion of the septum on the left side.

DR. MOSHER, closing, presented a slide which he thought probably some of the pathologists could throw some light on. He was inclined to take the word of the pathologist at

*See page 981.

the hospital. He considered it an adenoma. He made a section of the body of the tumor itself, but further than that he did not have a chance to talk with him about it. He just took his word that that was what it was. He was rather surprised to have heard the other men say that had seen papillomas but not adenomas, so he was very glad to have had the privilege of presenting the case.

The Effects of High Explosives on the Ear.

J. GORDON WILSON, M. D.

To the otologist an outstanding feature in the present war is the number of cases of deafness, either total or partial, occurring without any demonstrable trauma capable of accounting for the deafness and due to the bursting of the high explosive shells. The force of the explosion of these shells is enormous; it may pitch a man several yards away or blow him out of the trench. The deafness is usually a combination of conduction deafness and nerve deafness, but the relative part played by the middle ear and the nerve mechanism varies considerably. Dr. Wilson has fully entered into this subject in previous papers. It need only be said that the worst cases of deafness he had seen had been associated with no drum rupture and very little apparent damage to the middle ear. In early cases the otologist often has no difficulty in diagnosing a trauma. However, the rupture of the drum or the congestion of, or the effusion into the middle ear may have been so slight that evidence of these may have entirely disappeared by the time the man gets to the base hospital.

In previous wars concussion deafness was rare. Gruber, who was otologist at the War Hospital in Vienna during the Austro-Prussian war, saw only one case. In the Franco-Prussian war, in the Prussian army, only twelve cases were recorded. In the Russo-Japanese war only 101 cases were recorded in the Japanese army.

The outstanding result of the concussion is the nerve deafness. The following hypotheses have been advanced to account for the deafness: (1) That there are pathologic changes in the organ of Corti and the ganglion cells; (2) that hemor-

rhages have occurred in the internal ear; (3) that there is an interruption in the central auditory path, due to small hemorrhages; (4) that there is a temporary interruption in the auditory path from functional disturbances not due to organic lesions. At first Dr. Wilson was inclined to lay too much importance on the fourth hypothesis, but from specimens he had examined, some of which were shown, he was inclined to think that though a number may be due to a functional derangement, there certainly were cases in which the deafness is due to an organic lesion.

The first series of the slides which he showed illustrated the results of laboratory experiments by Wittmaack, Yoshii aud Hoessli on guinea pigs exposed to explosives. These bring the laboratory work into line with the results obtained in man. The laboratory results showed:

1. Rupture of the tympanic membrane and hemorrhage into the middle ear.

2. Pathologic changes in the organ of Corti amounting even to complete destruction.

3. Little or no change in the vestibular mechanism.

The second series of slides obtained from a man who died from severe abdominal wounds forty-eight hours after injury from shell burst, showed:

1. Intact and undamaged footplate of the stapes.

2. Hemorrhage into the internal auditory meatus and the modiolus.

3. Changes in the organ of Corti—pillars and tunnel intact; edema and small cell infiltration into the basilar membrane and between the hair cells.

4. Displacement of the tectorial membrane and its adhesion to Reissner's membrane by serous effusion.

5. Little or no change in the vestibular mechanism.

The third series of slides showed:

1. Variation in the fields of vision associated with shell concussion deafness.

2. Devices to protect the ear from shell explosives.

A very important problem to be solved is how to protect the ear against the concussion. The use of cotton does not satisfactorily block the concussion; clay impregnated with fiber cuts out all sounds and prevents the hearing of orders. The

Armstrong device, which was shown, avoids both of these difficulties to a large degree, but is difficult to wear.

The device by Professor Michelson and the doctor, which also was shown, appeared to the members to answer all requirements. Laboratory experiments with pistol shots showed that it protects animals perfectly and, what is of importance, acts more effectively the higher the explosive force.

DISCUSSION.

DR. SHAMBAUGH said certain facts had long been recognized in regard to the relation between injuries of the internal ear resulting from explosions and injury of the drum membrane. Where the drum membrane had been ruptured the injury to the internal ear is usually less; or in other words, the cases where the internal ear had been most severely injured had been cases where the drum membrane had remained intact.

In regard to the actual injury which is sustained in the labyrinth of the ear as the result of explosions, the facts in regard to these injuries have only rather recently been ascertained. Examinations made of human material have not as yet thrown any light upon this interesting problem, for a reason which anyone who had worked histologically with the internal ear understood. It was not possible to secure in human material that fixation which is necessary to prevent the development of artefacts which resemble so closely the changes produced in the organ of Corti by explosions. In order to get the proper fixation it is necessary to inject fixing fluid into the circulation either before or immediately after the death of the individual. This work can only be done with animals. In the specimens exhibited it was impossible to say whether all of the changes were due to faulty fixation or not.

If a pistol was shot or exploded close to the ear of a guinea pig and then the labyrinth immediately removed, with proper fixation one can always recognize certain definite distortions in the cells which make up the organ of Corti. If after this experiment the guinea pig is killed, say after a month or two, one or two things present themselves: Either the organ of Corti has undergone a degenerative process in which the

specialized epithelium has become flattened, or a complete regeneration of the distortions caused by the explosion has taken place. These facts have been definitely worked out and explain exactly what is met with clinically. In cases where the ear has been injured by an explosion, not infrequently the deafness remains permanent. In other words, the organ of Corti undergoes degeneration. In some of the cases, perhaps where the injury had not been so severe, a regeneration of the organ of Corti takes place and there is a gradual return of the hearing function. Dr. Shambaugh remembered very distinctly when Dr. Wilson first returned and expressed the view that the injury to the hearing was the result of intracranial lesions, so he called his attention to the work which had been carried on by Siebermann and expressed the view that he did not see any reason for assuming an intracranial lesion as the cause for the defect in hearing, when it was perfectly well known what took place in the labyrinth itself. It seemed that Dr. Wilson also took this point of view later on.

He was very much interested in one of the observations which Dr. Wilson had made, namely, that in these cases of concussion with deafness there was also some vertigo, and yet from the examination of histologic preparations no injury could be detected in the end organs of the vestibular nerve —that is, in either the macula acustica or the crista acustica. He also asked Dr. Wilson whether he had had an opportunity of observing any of these cases while they were still having this socalled vertigo, and whether he had observed any of the characteristics of vestibular vertigo, and especially whether there was any spontaneous nystagmus. Patients have often said that they had vertigo, but when it came time to question them more closely, it was found that they were not really suffering from vertigo at all, but were using the term vertigo rather loosely to express other indefinite sensations.

Dr. Holinger said that a series of experiments on birds was made at Professor Liebermann's laboratory in Basle in the winter of 1913-14, and they were published in December, 1917, by Benno Schwabe in Basle. The experiments treated the questions of Dr. Wilson's paper. It demonstrated the birds have no cochlea, instead a straightened out part called lagena, but the birds have a basilar membrane and an organ

of Corti, which differs in several respects from those of the mammals. It was, however, impossible for Dr. Holinger to go into details. The results of the experiments were of the greatest interest, and practically solved a number of questions which were in the foreground of our interest in the physiology of hearing, as well as in the destruction caused by over-irritated organs of hearing by explosions close to the ear.

The second point was the great controversy between Wittmaack and Liebermann as to the primary location of the destruction. Wittmaack said the ganglion cells and the nerve elements were destroyed first—the destruction of the end organ is secondary. Dr. Wilson drew attention to the ganglion cells. Liebermann opposed that view and said that the injury to the ganglion cells and nerves was secondary, and that the primary injury was found in the organ of Corti. In other words, there is an ascending degeneration of the nerve apparatus and not a descending degeneration. That Liebermann was right was conclusively shown in these experiments. To study the whole question in the original communication was highly instructive, and on account of the clear and unequivocal diction a veritable pleasure.

Dr. Andrews said it was very interesting to note the position of the tectorial membrane in the cases of injury in the specimens which Dr. Wilson had shown. Following injury it was well up against Reissner's membrane, and in Dr. Wilson's specimens it was apparently attached to it. The position of the tectorial membrane may have had something to do with the permanency of the impairment of hearing. It was possible that its becoming attached to Reissner's membrane may have had something to do with the permanency. Of course this was only a suggestion.

Dr. Lewy asked Dr. Wilson if it was possible to tell in the human subject whether the injury was due to a sudden change in atmospheric pressure, or whether it might have been due to the head being knocked against the ground.

He also wanted to know whether they had tried the simple device used by the aviators as a means of protection of the ear. They simply use a piece of adhesive plaster over the earpiece of the helmet, punctured with numerous pinholes. They said that gave them relief from the discomfort of the

rush of cold air. If this proved successful, it would do away with the necessity of wearing something in the external auditory meatus.

Dr. Wilson, closing, said the question had been asked how can one account for the vertigo, often of long duration. He believed that the changes in the internal auditory meatus and the small hemorrhages so often seen in the course of the vestibular path were the basis for the vertigo. In regard to the relation of the displacement of the tectorial membrane to the deafness one may speculate, as Dr. Andrews had said, in regard to what would happen if the serous effusion which apparently fixes it to Reissner's membrane were absorbed. A more interesting question was why is that tectorial membrane so displaced. An answer to this would give some idea of the mechanism involved in the perception of sound.

In regard to perforated plates, he did not think they had been used. Dry cotton, which is perforated, is used very much, but is not satisfactory.

ABSTRACT OF THE PROCEEDINGS OF THE FORTIETH ANNUAL CONGRESS OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION.

Held at Atlantic City, New Jersey, May 27-29, 1918.

By Emil Mayer, M. D., New York, Abstract Editor.

The president, Dr. Thomas H. Halsted, Syracuse, New York, called attention to the fact of this fortieth anniversary comprising practically the whole period of modern laryngology.

He paid a tribute to the memory of Dr. E. Fletcher Ingals, a founder of the association, who died but a few days before the meeting, and who remained to the last an Active Fellow, furnishing last year one of the most valuable papers of the meeting.

He welcomed, also, Dr. H. S. Birkett of Montreal, one of the fellows of the association who, responding promptly to his country's call, had spent nearly four years in active service, rising to the highest rank and responsibility.

Each fellow of this association feels a personal pride in these achievements.

Of an active membership of eighty-two, thirty per cent are in the active Naval and Military Service of the United States, which is a very creditable showing, considering the average age of its fellows.

The speaker then presented for the subject of his address:

A Diagnostic Clinic for Pay Patients.

While organization of hospitals for the care of ward cases and dispensaries for free ambulatory cases have been well organized, there has been no combined arrangement for the care of private patients, hence it frequently happens that a diagnosis cannot be made because of the expense involved in calling in as many physicians as the case really demands.

Ofttimes the patient seeks relief by consulting various physicians of his own volition, producing disappointing results.

It sometimes happens that the right physician is accidentally consulted, and the cause of the obscure symptoms found, with a resulting cure.

It is for the profession to devise the means of correcting this

very grave fault. As a result there have arisen many institutions where the medical staff is comprised largely of specialists of different branches. While some of these institutions are excellent in every way, the great majority are not of this character, and as long as they are purely commercial organizations they never will be.

The speaker said that the scheme devised, worked out and practiced for nearly three years by the Clinical Club of St. Luke's Hospital, San Francisco, offered the best foundation from which to build a diagnostic clinic, and that it had met this particular situation.

The medical staff of this hospital consists of twenty-four full staff members, four consultants and ten assistants, with an excellent clinical laboratory and complete X-ray department.

In the hospital to which the speaker is attached, the first choice was given the regular staff, after which the assistants were given an opportunity when vacancies arose. The staff was divided into two groups serving on alternate months, with a third group known as the auxiliary group, made up of those specialists whose services would not be required in every case. The latter become available in any case in which the group chairman thinks such service desirable.

The chairman is responsible for the history of the case, and after his examination is made arranges for the visits of the other members of the group, together with such members of the auxiliary group as he may desire. A supervising nurse keeps the records and attends to the financial end of the work, sees that specimens are furnished the laboratory, arranges the details of the physician's visits, is present at all examinations, typewrites the notes and attends the general consultations, taking the minutes and transcribing them.

After all examinations, clinical and laboratory, have been completed, a general consultation of all who have had to do with the case is held, and every possible diagnosis arrived at, the physician referring the case being present and participating in the consultation.

A satisfactory conclusion having been reached, a report is sent to the referring physician, a second copy to the patient or his responsible relative whenever this seems desirable, and a third retained in the files of the clinic.

Only cases that are obscure and complicated and apparently cannot be diagnosed by the average physician, are accepted by the clinic.

A minimum fee of $50.00 and graded upward, according to the patient's financial situation, is charged. Such fee includes the services of the medical man and of the laboratory and X-ray departments, as well as of the supervising nurse. In addition, the hospital charges regular room rates for time occupied.

The portion of the fee remaining will be finally divided equally among those who have examined the case, to be received by them individually or be voted by them for the purchase of new equipment for improving the service of the clinic of the hospital, the latter being expected to be the disposition of the funds for some time to come.

In rendering this service they will themselves receive much knowledge and should benefit greatly through these examinations and consultations, adding materially to their diagnostic ability.

The hospital will benefit by the steadily increasing efficiency of its staff.

Finally, the speaker called attention to the work of its committee in the National Council of War Defense, and requested a quick response to the appeal of the Surgeon General for voluntary medical service to meet the demands of the drafted army.

Each man must weigh the matter for himself, and putting aside any argument and all questions of personal advantage, reach a decision that he will be willing to submit to the scrutiny of his fellows and abide by their decision. Those who can go are to be congratulated; they are to be envied; they are the favored ones of the profession. A doctor who in this emergency can conscientiously go and fails to respond to his conscience and his country's call, putting a selfish profit first, is not to be envied but to be pitied.

To commemorate the fortieth anniversary of this society, a historical review of the early days of laryngology was read by the honorary president, Dr. J. Solis Cohen, of Philadelphia, followed by Dr. D. Bryson Delavan of New York.

The scientific program then followed with the papers and discussions here presented.

Report of Some Interesting Cases of Vincent's Angina.

CLEMENT F. THEISEN, M. D.,

ALBANY.

There are two distinct clinical types of the disease, one form to be differentiated from diphtheria and other pseudomembranous anginas occurring almost exclusively in young people, while the other form has a localized ulceration simulating syphilis occurring mainly in adults, usually, in the writer's experience, associated with carious teeth, especially in those whose mouths are not well cared for.

The odor is distinctive and characteristic, and if not promptly treated, extensive ulceration of the fauces occurs with fatal ending.

The writer has had two fatal cases. One previously reported in 1912, and the other a recent case in a man thirty-two years of age. The uvula and part of the soft palate had been practically destroyed, and there was deep ulceration of both tonsillar surfaces and of the gums around the last molars. The ulcerated surfaces were covered with a tenacious pseudomembrane. The molar teeth were badly decayed, and the gums bled easily when touched with a probe. The odor was so bad that it required a good deal of courage to examine him. He said the condition had been going on for several weeks, and he had received no treatment. He had been using a mouth wash of peroxid and water.

He was in an extremely weakened condition, because the pain in swallowing was so severe that he had not been able to take much nourishment. No history of syphilis could be obtained. Smears from throat swabs verified the diagnosis of Vincent's angina.

He was given a strong solution of potassium chlorate, powdered alum, carbolic acid, glycerin and water, to be used as a gargle, and locally the ulcerated surfaces after cleaning were swabbed with a saturated solution of methylene blue in alcohol. He was given K. I. in large doses. This is always administered in the writer's cases, whether a history of syphilis is obtained or not. Blood count showed a moderate leucocytosis. He failed steadily in spite of all efforts, and died

about two weeks after he was first seen. The larynx was not involved in this case.

Salvarsan was used both locally and intravenously without any appreciable effect. No autopsy.

Pure alcohol swabbed on the ulcerated surfaces is also extremely valuable. The greatest difficulty is in having the severe cases get enough nourishment, because the pain in swallowing is often so great. A solution of orthoform in olive oil, swabbed on the ulcerated surfaces before meals, affords a certain amount of relief. A spray of carbolic cocain in the worst cases gives more relief than anything else, if used a few minutes before meals. In some of the adult cases of the ulcerative type we are probably dealing with a combination of syphilis and Vincent's, even when we fail to obtain a history of syphilis. That may be one reason why salvarsan acts so promptly in some cases, although the concensus of opinion would seem to prove that the arsenic preparations do have a specific action. He has known cases of this kind in which there was a positive Wassermann (with no syphilitic history), with the typical clinical and microscopic evidence of Vincent's.

DISCUSSION.

DR. CHRISTIAN R. HOLMES, Cincinnati: I should like to ask as to the temperature of the patients; whether blood cultures were made in the two severe cases, and how he used the alcohol treatment—by applying it locally or not. In Camp Sherman we had quite a run of Vincent's angina in the soldiers; but none of them were seriously ill. All were the kind of cases that yield readily to treatment.

The treatment was nitrate of silver bead applied in the crypts, using it on a heavy silver wire, the patients using gargles of permanganate of potash and peroxid of hydrogen. Gargling with vinegar diluted with equal parts of water was tried lately and appeared very effective.

DR. LEWIS A. COFFIN, New York City: We have had many papers on this subject. From these it is evident that patients have gotten well under various forms of treatment. It strikes me therefore that if these cases are seen early, recovery may be looked for, if any of the various methods be applied vigorously. The speaker referred to a case which he treated

twice daily for about a week, when he told the patient that he was practically well and need not return for forty-eight hours. The same afternoon, after sitting out during a ball game, he was seized by a chill, which was the ushering in symptom of a typical attack of follicular tonsillitis.

COL. HERBERT S. BIRKETT, M. D., Montreal, Canada: Perhaps there is no condition which is more prevalent than Vincent's angina amongst British troops. I seldom saw it in any of the colonial troops, and this I think arises from the fact that the mouth conditions are very well cared for amongst the Canadians. The condition was found not only on the tonsils but also on the gums, even as far forward as the incisor teeth; it would seem as if this was due rather to direct infection. My experience with this condition is that it yielded rapidly to treatment consisting of an application of hydrogen peroxid, liquor arsenicalis and vin ipecac.

DR. EMIL MAYER, New York City: It is relatively easy to make a diagnosis of Vincent's angina when there is an exudate and you can make a smear; but I saw some days ago an instance in which the diagnosis comes to me as a very great surprise. This was in the case of a lady who took good care of her teeth, and was a woman of much refinement. She consulted me on account of a spasmodic cough. She had a skin affection for which she was being treated. I saw a simple mild exudate on her soft palate, which I felt to be an evidence of the skin infection on her mucous membrane. I felt that she had a similar condition on her trachea, because of the negative result of all of the examinations. Her sputum was really more saliva than anything else; and I was intensely surprised at the report that it was full of the fusiform bacilli. There was an absence of anything like a membrane, yet the condition occurred, and in a person not neglectful of her teeth or anything else; so it probably occurs much more frequently than we really have a right to expect in this class of cases.

The treatment that has answered best for me has been the local application of salvarsan, together with the iodin and glycerin, which I recommended at the time the first case was reported by myself in the English literature. I have never seen the severe fatal cases. Arrowsmith reported a case in which the patient nearly died. I think that it behooves us to

be on watch, because we may probably discover cases where we do not dream of them.

DR. GREENFIELD SLUDER, St. Louis: Dr. Theisen spoke of a solution of methylene blue in alcohol alone. I am glad to know that; but I have also used the methylene blue in powder and in aqueous solution, and likewise found it to answer the purpose.

DR. CLEMENT F. THEISEN, Albany, closing: Replying to Dr. Holmes' question regarding blood cultures, I would say that we did not take blood cultures, but we took blood counts; and the leukocytes in both cases were increased. I forgot to mention the increase in the polynuclears, and also to mention a method of treatment—a combination of old drugs which is practically a specific, either as a gargle or in the spray form. This combination consists of potassium chlorate, powdered alum, glycerin and water. It works like a charm. The alcohol is used locally.

Report of Some Cases, Mostly Traumatic, of Serious Damage to the Nose and Accessory Sinuses, Operated Upon Externally, With Excellent Cosmetic Results.

JOHN R. WINSLOW, M. D.,

BALTIMORE.

The writer reports a number of cases of operative cure after serious injury to the face:

1. Extensive traumatism of the nose, face and frontal sinuses due to a fall from a height. Operative cure with exceptional result.

2. Frontal empyema with extensive bone necrosis and external fistula, operated upon externally in several sittings. Cure of condition with excellent cosmetic result.

Several interesting points were presented by this case:

(a) Lack of intranasal pathologic conditions. A virulent infection (erysipelas?) seemed to have attacked the frontal sinus and uppermost portion of the bony framework of the nose without involvement of other nasal sinuses.

(b) The posterior (cerebral) sinus wall was denuded, but was hard and seemed devitalized rather than necrotic. It took a very long time for it to regenerate (twenty-six months),

but his own judgment and the advice of colleagues was that it was better to delay than to assume the risk of removal.

(c) Marked anesthesia of the operative field, the packing being for a long time painless, doubtless due to the devitalized bone.

(d) Excellent cosmetic results.

3. Fracture of the external bony framework of the nose and the nasal septum by the kick of a mule, causing depression of the tip of the nose and great disfiguration. Restoration of appearance and function by operation.

4. Fracture of the right nasal bone and nasal process and a portion of the orbital process, by an iron rod; formation of sequestra and abscess, with secondary infection of the right antrum. Operation and cure, with good cosmetic result. Photographs showing their excellent results were presented.

DISCUSSION.

DR. JOHN E. WINSLOW, Baltimore: I should like to hear from Dr. Coakley or some of the other experts, as to the proper plan of treatment under such conditions as I have described, where there is necrosis of the cerebral wall of the frontal sinus. How long are we justified in waiting for nature to attend to it? Did I wait too long, or was I too conservative?

DR. CORNELIUS COAKLEY, New York City: When I have operated on the frontal sinus I have never found actual necrosis of the wall unless there had been syphilis. It is unusual for me to find such a condition. What I have found is that in cases that have been operated on previously, there has been a temporary cessation of the discharge with fistula formation. When I have opened up the frontal sinus in these cases it has not been infrequent to find areas of very marked softening in the bone, such as one finds in a mastoid operation at the borders, when one has gotten back of where the large cells are and come to the cells just between these and the cancellous bone. I think that there is no reason why that bone should not be regarded as infected bone, just as in the mastoid region; and I feel that neglect to clean out this diseased bone and get down to healthy bone, whether in the anterior wall or anywhere else, is not good surgery. You

should get to good bone, even if you expose the dura in the frontal region.

In one instance I found such a degree of softening of the posterior wall that I felt sure that I should find exposure of the dura and epidural abscess. Fortunately, however, that was not the case. I went through an area of three-eighths of an inch of vascular soft bone before coming to what must have been a very thin area of good bone at the posterior wall of the frontal sinus. The soft bone was all cleared out. A drain was placed in the wound for a short time, leading to the nose. The wound was sewed up, as in the ordinary Killian operation, and the patient has made—temporarily at least—a good recovery. The operation was done three months ago, and up to the present time there has been no recurrence, although there were two or three before that. Soft or diseased bone, or any other bad bone in the frontal sinus, should be treated just as you are in the habit of treating the same kind of bone in the mastoid or any other region.

DR. LEWIS A. COFFIN, New York City: I should be much less afraid of a curette than of leaving diseased bone in a patient. As to whether the posterior wall being necrotic and perforated is an invariable sign of syphilis, I have grave doubts. I have seen this condition in comparatively few cases; one case was in a child of six years having perfectly healthy parents. In reporting that case I spoke of another that I had previously seen in which the anterior wall was so soft that I removed it with a spoon curette and stated that I did not see why the posterior wall should not be affected by the same pathologic process as the anterior wall. A case somewhat similar to the one just reported comes to mind. A young woman was riding in an automobile when the peculiar accident happened. The shaft of a wagon to which a horse was attached entered the antrum through the middle of her cheek, fracturing the floor of the orbit and the anteronasal wall. She had been under treatment for some time when I saw her. Removing a pad of gauze from her face revealed a stream of pus pouring from the open wound in her cheek. I made an incision over the eyebrow down over the ridge of the nose and the center of the skin covering the columnar cartilage and dividing the upper lip in the median line. Turning the flap well back

gave a good exposure of all the diseased parts, which were thoroughly cleared out. We and our patients are fortunate in the kindly way in which incisions of the face heal. In this case there was practically no scarring except where the shaft of the wagon pierced the cheek.

Dr. George L. Richards, Fall River, Mass.: The ability of the face to heal is very remarkable. I recall that some years ago I had a patient who was riding a bicycle down a hillside when the chain broke, and he was pitched suddenly forward in such a way that he tore off the front of the face from the nose to the chin, and in addition got all the dirt of the street into his wounds. A number of operations were necessary, but in the end a fairly good looking face resulted.

Dr. T. Passmore Berens, New York City: It seems to me that this is the same condition that we find in the mastoid of bone that is not syphilitic but is simply an unusually firm hard bone. We have to be patient, and let it heal. A number of years ago I mentioned the mild pressure that was needed in these cases, such as would come from a pince nez with long horns pressing the nasal bones together. It seems to me that if he had exerted a slight constant pressure, such as you get from a pince nez, he would have overcome that broadening of the nose. I merely mention this to accentuate the benefit of constant mild pressure.

Dr. Bryson Delavan, New York City: In suppurative conditions of the nasal sinuses if there should be any question of the existence of syphilis, operative work must be undertaken with caution, since under antisyphilitic treatment many cases have been cured or have satisfactorily improved without operative interference. Many cases could be quoted to prove this. It may be said, therefore, that where there is a positive Wassermann reaction wait, if possible, until a course of specific treatment has either cured the sinus disease or made the necessity for operation clear.

Dr. John R. Winslow, Baltimore, closing: I do not want to leave anyone under the impression that I am ignorant enough to leave soft bone and close it in the wound. It was not soft, but hard as steel, and I curetted it three times as much as I thought was safe. I acted not only on my own best judgment, but also on the advice of several friends.

Carpet Tack in the Right Bronchial Tube of a Patient for Two Years With No Pathologic Symptoms; Exhibition of Plates.

DUNBAR ROY, M. D.,

ATLANTA.

This occurred in a female aged twenty-eight years. X-ray showed the tack in the right bronchus between the seventh and eighth ribs. Its removal was at once attempted by upper bronchoscopy and failed. Tracheotomy was performed the next day, the bronchoscope passed, but he was unable to grasp and dislodge the tack, and the tracheotomy wound allowed to heal.

Five months later a bronchoscope was easily introduced by upper bronchoscopy by Dr. R. C. Lynch. The tube was too short and the foreign body could not be removed.

The patient has been entirely well since then, now two years, increasing in weight. X-ray photographs were shown showing the tack still in situ.

The writer presents records of a number of cases of this character, many of them without producing untoward symptoms.

DISCUSSION.

DR. T. H. HALSTED, Syracuse: In connection with this case of Dr. Roy's, I should like to report the recent removal of a foreign body from the right bronchus occurring in a girl of ten years. This child while playing, having occasion to put her pocket handkerchief to her mouth, inhaled a metal clip, shaped somewhat like a fish hook, which had been in her pocket. There was an immediate attack of dyspnea, lasting a few moments, but within a few minutes no symptoms beyond a sensation as of something sharp lodged in the throat remained. A physician saw her within ten minutes, at which time all symptoms had disappeared, beyond the pricking sensation. He assured her that she must either have expectorated or swallowed it. She had no trouble that night, but the next morning, the sticking sensation referred to the neck continuing, she consulted another physician, Dr. Swift, who had an X-ray made. This disclosed a foreign body in the right bronchus. She was referred to me for operation. Under

general anesthesia I soon located the metallic object by upper bronchoscopy and made repeated but unsuccessful efforts at removal. The X-ray failed to tell whether the sharp point was directed up or down, and it could not be determined by direct inspection. The next morning stereoscopic plates were made, and showed the foreign body to be in the right bronchus, sharp point upward. Under ether, the trachea was opened, and under lower bronchoscopy the foreign body was, after two hours' work, removed. It was in the second division of the bronchus, firmly wedged, but by manipulation it was finally removed by a long alligator forceps with but little damage to the bronchioles. It was a flexible steel clip used in clothing stores for holding cardboard price marks, shaped like a sharply bent fish hook, the shaft being three-fourths of an inch long and the pin portion half an inch. It, together with the stereoscopic plates, are presented for examination. The tracheal wound was at once closed, the child made an uneventful recovery, leaving the hospital in eight days. It was the most difficult case of its kind I have met with.

Concerning Atrophic Rhinitis and Ozena; With Report of Cases Referred To Last Year.

LEWIS A. COFFIN, M. D.,

NEW YORK CITY.

The speaker believes he was the first to suggest that the foul odor which so frequently accompanies atrophic rhinitis and constitutes the disease known as ozena has its origin and is caused by a chronically diseased and poorly drained antrum. Since making this statement others have reported to him that they had treated several cases in this manner with the same excellent results.

In one of his cases there was no improvement whatever, although operations had been performed on both antra.

He was unable to account for the failure in this instance.

DISCUSSION.

DR. CORNELIUS G. COAKLEY: It seems to me that all the odor should not be attributed to disease of the maxillary sinus. If the patient had pansinuitis I do not see why it

should be cured by washing out the maxillary and leaving the same pathologic process in the ethmoid and frontal. Of course you do not get so much odor from them, but I should think you should clear them up as well as the maxillary, and I suggest that as the cause of the continuation of the odor.

DR. GEORGE L. RICHARDS, Fall River: I have had good luck in using the chlorinated oil in the type of case that Dr. Coffin has been speaking of. It is purely empirical. I used it thinking that it would do some good to place it on the surface and hold it there. It was done with the swab or spray, and not after opening the antrum. I have not been converted to the belief that all or even the majority of cases of atrophic rhinitis are due to antrum disease.

DR. THOMAS H. HALSTED, Syracuse: After seeing Dr. Coffin's cases last year, I treated a case with the foulest odor I ever encountered. I did a double antrum (simple Mikulicz) operation on her. The odor was simply unbearable and unendurable. Nothing further was done. The saline douche that she was using was kept up. I did not see her, after she went home, for a year. Then the odor had entirely disappeared. There was no odor from the nose whatever, and no other treatment had been carried out during this time but the washing out. In three of five other cases there was absolutely complete cessation of all odor. It was one of the most satisfactory operations of any that I have done. Of three of my five cases, the odor of which was very bad, was entirely relieved by the antrum operation; in the other two it was greatly lessened. There was a marked diminution in the amount of crusting in the nose. The odor comes, I am satisfied, more from the gas from the antral secretion than from the nasal scabs, though doubtless some comes also from the other sinuses, the frontal, ethmoid and sphenoid, when they are involved, and their treatment, by ventilation through operation, will be required in such cases.

DR. HENRY L. SWAIN, New Haven: What did you find in the maxillary sinus?

DR. THOMAS H. HALSTED, Syracuse: Nothing much; the operation was done by simply opening through the nose. I was not able to see as you would with a Caldwell-Luc. I made

a good big opening through the nose and got ventilation and prevented the retention of secretion and pus.

DR. SWAIN, New Haven: Did the X-ray show anything in the antrum before operating?

DR. HALSTED, Syracuse: There was no X-ray plate made.

DR. SWAIN, New Haven: Did the transilluminator?

DR. HALSTED, Syracuse: Yes, and I did one of these operations recently in a nurse where the transilluminator was clear.

DR. SWAIN, New Haven: You operated in spite of that?

DR. HALSTED, Syracuse: Yes.

DR. GREENFIELD SLUDER, St. Louis: The point that I should like to make is that if Dr. Coffin has established the opening of the antrum for the cure of ozena and the stench of an atrophic rhinitis, it seems to me that it is one of the greatest advances presented to us for a long time. Last year I asked the question, which was not answered, "What happens in a case of atrophic rhinitis when the olfactory fissure is crusted all around?" There is an antrum open, but the atrophic process is as active and destructive there as elsewhere.

DR. HENRY L. SWAIN, New Haven: In speaking to Dr. Sluder's remarks, I was endeavoring to bring out the proposition that Dr. Coffin has brought before us, because he will be accused of saying that he cures atrophic rhinitis by opening the antrum. He does not cure the rhinitis, but does cure the odor, as Dr. Sluder says. As I said at the last meeting, it was a most radical remark on Dr. Coffin's part, and if it bore truth as promised it was really an epoch-making suggestion, and I rise to confirm Dr. Sluder.

DR. GREENFIELD SLUDER, St. Louis: I forgot to state that I am going to try it when I get home.

DR. HANAU W. LOEB, St. Louis: It is obvious that if there is any process of this nature in the antrum, by securing good drainage there will naturally be improvement in the odor, just as I have found that by clearing out the ethmoids a particular odor that may accompany the process will improve or disappear. I feel that Dr. Coffin's contribution in this respect constitutes simply calling attention to the fact that the antrum

being the largest cavity connected with the nose and most intimately associated with its function, the greatest opportunity for the development of these crusts is offered by it whenever it is subjected to the action of the putrefactive bacteria. I do not see why it should be affected in all the cases, or even in more than a fair number of the cases, because, according to my information and observation, the antrum is not more often affected than other sinuses.

DR. HENRY L. SWAIN, New Haven: If the people will take enough pains to cleanse the nose properly most of them can remain inoffensive to their immediate environment. That would not be the case if the odor depended entirely on the condition of the interior of the antrum. So, although I am particularly friendly to Dr. Coffin's suggestion, I am sure that we are not going to cure all cases by opening the antrum, because all cases are not due to that. We are not saying that he does not do it, but we hope to do equally good work. In an antrum where I could see in pretty well through a large natural opening between the antrum and the nose, where there was an atrophic process in the nose, we could see in the antrum that the mucous membrane lining the antrum had the same process going on in it as in the nose. That is, there were masses of atrophic material lining the entire cavity of the antrum. If that could exist once, it could many times, and that explains why in some of these cases in which, as Dr. Halsted discovered, where there is no darkness under transillumination, there will be going on the same process as in the nose, which can be relieved by opening the sinus, and only by doing so.

DR. T. HALSTED, Syracuse: In three of my cases the odor was extreme. In the other two, the odor is much relieved. It is simply remarkable what improvement has taken place. I can only say in a general way that there was a diminution in the amount of crusting. I do not believe that all the odor comes from the crusting. I believe that it will be proved that it is from the maxillary sinus as well as the ethmoid and frontal.

DR. GREENFIELD SLUDER, St. Louis: If the author can locate the antrum as the point from which the stench proceeds,

that is the most valuable contribution that we have had for a long time.

Dr. L. A. Coffin, New York City, closing: Dr. Sluder has given a perfectly proper definition of ozena as "the odor accompanying atrophic rhinitis." Then he talks of seeing scabs about the olfactory fissure—but does not state that there is any odor or ozena from these particular scabs. We are not discussing scabs but an odor known as ozena.

Dr. Coakley asks why the antrum rather than the other sinuses? The antrum is practically the only sinus I have ever opened from which was emitted a foul odor. This occurs frequently and is due to the anatomic structure of the antrum. Drainage is at the top, while in most other sinuses drainage is from the bottom.

The case of a young lady comes to mind. She had extreme atrophy, no inferior or middle turbinates in sight, nose much bescabbed, and when she first came emitting a foul and stinking odor. Her antra having been opened and cleansed, the odor (ozena) has entirely disappeared, while undoubted disease of many of the other sinuses persists, as does scabbing, although not to the same degree as before the treatment of the antra.

She was one of the cases seen by Dr. Halsted. Another was a young boy about twelve years of age. Apparently he had not only marked disease of the antrum of one side but marked ethmoiditis as well—nose full of crusts and ozena. I opened and treated the antrum, purposely leaving the ethmoids untouched. The odor disappeared.

As to the value of the X-ray in diagnosis: It is a help, by no means infallible. Personally, I care little for another's reading of the negative. Now, these are the thoughts which I wish to impress and leave with you: First, that the odor of ozena comes frequently from disease of the antrum, and is relieved by the treatment of the antrum. Second, please remember that I have today reported a case not so relieved.

I trust that you will all try the treatment, as has Dr. Halsted, and that you will bear in mind that we do not expect 100 per cent perfect in 100 per cent of the cases.

Three Unusual Nasal (Sphenopalatine) Ganglion Cases.

GREENFIELD SLUDER, M. D.,

ST. LOUIS.

The usual neuralgic picture is pain in and about the eyes and the upper jaw, the teeth, extending backward about the temple under the zygoma into the ear, making earache; and then backward into the mastoid; and severest usually at a point two inches back of the mastoid, to extend into the occiput, the neck, the shoulder; into the shoulder blade, and sometimes the axilla and breast, and frequently down into the arm, forearm, hand and even to the finger tips.

Added to this symptom complex, frequently is found a sneezing and watery secretion more marked probably in the morning, frequently extending through the day; a red external nose, with tearing eyes, photophobia, and a sense of discomfort in the eyes difficult for the patient to describe.

Occasionally, however, are added unusual features to this clinical complex. These cases record phenomena that at present are unique and cannot be explained. They may be recorded as facts.

The first case was relieved of the dizziness and the headache after cocainization of the ganglion, the headaches returning in six hours. The patient passed from further observation.

In the second case headache ceased, but as an effect of cocainization the right eyelid drooped very perceptibly to obscure probably half of the blepharospasm, and the pupil contracted to one-half of its fellow of the opposite side.

The third case was one of a right sided blepharospasm of great severity, and was a post-ethmoid sphenoid suppuration with polyps on the right side.

Cocainization of the right nasal ganglion relieved the blepharospasm for a period of three hours, and injection of the same ganglion was followed by relief of the spasm for three to six hours.

Operating on the ethmoids and sphenoids did not relieve the spasm.

The left side was then operated upon without relieving the spasm, although the right eyelid opened after injection of the left ganglion.

DISCUSSION.

DR. EMIL MAYER, New York City: We are much indebted to Dr. Sluder for calling attention to these nasal ganglion cases and what may be done for them. I recall the case of a young woman whom I had successfully treated for dysmenorrhea by intranasal treatment. She came to me later, suffering with headache, and I cocainized the nasal ganglion on the side that she had her headache. An hour afterward she telephoned to say that her headache had completely ceased. She was so rejoiced that she felt that she must let me know at once how much better she was. She remained well for some months and then had a recurrence. She came again and had an application made to the ganglion on that side, and it has remained well ever since. Though I cannot explain why we can get such wonderful results in dysmenorrhea cases by a treatment which must perforce be called empiric, some of us may at some time be able to understand and explain it. The word empiricism must apply in this instance, as in the other instance of Dr. Coffin's, where we are unable to give a true scientific reason for the things that we do. The result is there, and the patient is happy, and that is all that can be said.

DR. HENRY L. SWAIN, New Haven: I have tried to cocainize the ganglion neuralgic cases, and I want to confirm the speaker in what he has observed on the question of dizziness, which I have been unable to explain any more than he has. One of the cases that I cocainized for headache also suffered from vertigo, and it was relieved entirely during the period of her cessation from pain, which was only two or three weeks. I made another application of adrenalin and cocain in combination, and she was relieved for so long that she did not think it necessary to have any further treatment of that kind. That was a year ago. I have not seen her since, and do not know whether she is still well or not.

The question of why we have pain in these sinus cases is most interesting. I have had a number of cases of severe pain with disease which I thought was well and have had an X-ray picture taken to learn the exact state of things. The neuralgia has ceased in five instances immediately after taking the picture, so there must have been something in the exposure

to the X-ray that broke up the nerve complex in some way and caused the pain to stop on the spot. Previously I had been treating the case without seeming relief. Immediately after taking the picture the pain stopped. This occurred in several instances in persons that I saw every day, the pain ceasing thereafter entirely. The question arises, Could this fact be put to some therapeutic use, and be of some therapeutic value? Shall we expose patients with this type of neuralgia to the X-ray to cure them? That question I leave to you to answer, but I do not think that this occurrence was accidental in all five cases in which there was no sinus disease but neuralgia and in which following the X-ray exposure the pain disappeared entirely.

DR. GREENFIELD SLUDER, St. Louis, closing: The case that Dr. Mayer has described was, I fancy, one of those in which the ganglion lies particularly close to the surface. That sometimes happens, and such a case may be exploded into the most violent lower-half headache by an ordinary coryza. Cocainization, in that case, is curative, not palliative merely.

Dr. Swain's observation that an X-ray relieved headache is exceedingly interesting.

Report of Syphilitic Necrosis of the Intermaxillary Portion of the Superior Maxilla.

LIEUT.-COL. CHARLES W. RICHARDSON, M. C.,

WASHINGTON.

The history of a young man, twenty-six years of age, married, stock broker's clerk, is presented. First seen on April 16, 1917, on account of intense pain in the floor and lateral wall of the left nasal chamber. There was no swelling or inflammation, and no interference with the function of the left nasal chamber.

The patient had shortly before been operated on, or stated that he had been operated on for a mild affection of the septum, although there was no evidence of such operation having been done. The patient's condition was attended by great suffering.

After a few days, during which transillumination and X-ray examinations were made of the incisors and lateral bicuspids,

as well as of the left antrum, all of which were negative, a Wassermann was made which resulted in a double positive.

As there was great tenderness over the upper incisors, patient had four of these removed. Salvarsan was given. In spite of this the intermaxillary bone separated by rapid necrosis in one mass.

The important and salient features of this case are:

1. Severe and continuous pain without any objective signs.
2. The severe necrosis without any inflammatory swelling.
3. The complete limitation of the necrosis within distinct anatomic borders.

DISCUSSION.

DR. HENRY L. SWAIN, New Haven: In a similar case to Dr. Richardson's, where the patient had most severe pain, after proper internal and local treatment, I removed a sequestrum fully as large as that which he has shown us. A fistulous tract led through to the floor of the nose. The entire premaxillary bone came away, but complete healing resulted.

Cyst of the Thyroglossal Duct—A Report of Two Cases.

OTTO T. FREER, M. D.,

CHICAGO.

The anatomic origin of these cysts is described by the author. Two cases are reported.

Case 1.—Male, began to have difficulty in swallowing, and at the same time noticed a swelling in the region of the thyrohyoid space. When first seen, on April 19, 1915, the swelling had increased and there was an increase in the difficulty in swallowing, so that to make solid food go down he had to try twice and help with a mouthful of water.

Examination showed a normal nose, pharynx, larynx and esophagus. In the thyrohyoid space a cyst was felt seemingly lying underneath the sternohyoid muscles. It was of walnut size and could be felt to interfere with the ascent of the thyroid cartilage to the hyoid bone when the patient swallowed—that is, the cyst became pinched between the two structures.

Operation on June 17, 1915. After dissecting off the superficial fascia and platysma muscle from a vertical median incis-

ion, a strong, tendinous layer of fascia was exposed that was attached to the lower border of the hyoid bone above and to the border of the thyroid notch below, so firmly binding down the cyst between itself in front, the median thyrohyoid ligament behind and the thyrohyoid membrane laterally, the cyst being unable to escape from the compartment in which it was confined when pinched during swallowing. When exposed by removing the fascia described, the wall of the semitransparent cyst was found to be so frail that it could not be seized lest it tear. This made the dissection tedious, as only the tissue surrounding the cyst could be held with tissue forceps, the cyst being held aside with dull retractors. The cyst was removed unhurt from its bed and was found to end above in a fibrous pedicle that lay against the posterior surface of the body of the hyoid bone and could be followed as high up as its superior border at the level of the hyoepiglottic ligament. Removal of the cyst exposed the median thyrohyoid ligament to view, this ligament forming the posterior wall of the compartment in which the cyst had been confined.

Microscopic section of a part of the cyst wall showed it to be composed of fibrous tissue lined with a layer of leucocytes intermingled with numerous, evenly distributed giant cells. There was no epithelium. The cyst contained a clear fluid. The removal of the cyst enabled the patient to swallow normally.

Case 2.—The second patient was a woman of thirty-two years, first seen on November 8, 1916. She had a swelling over the larynx since her tenth year. Iodin was injected into this swelling during the summer, and since this was done the swelling had gradually increased in size.

Examination showed a spindle shaped cystic tumor of the size of a walnut in the prelaryngeal region. The upper pole of the cyst could be felt to dive under the center of the body of the hyoid bone; its lower pole dwindled to a cord that could be felt to reach the region of the thyroid isthmus.

Operation under cocain on November 17, 1916. It took two hours to dissect out the cyst, as only the most delicate handling could prevent its rupture, and inflammatory changes caused by the iodin injection had made the cyst wall grow to its surroundings, so that the thyrohyoid and sternohyoid mus-

cles were firmly joined to it in front. The upper end of the cyst ended in a cord that extended upward under the body of the hyoid bone to its upper border, where it was lost in the hyoepiglottic ligament. Below, the cyst ended in a similar cord that joined the isthmus of the thyroid gland. When freed from its bed, just before removal the cyst ruptured, thick pus escaping, a cold abscess probably caused by the iodin injection.

After the cyst was taken away, the thyroid and cricoid cartilages, upon which it had lain, were bared to view.

In the first case the possibility of the cyst being one derived from a subhyoid bursa might come into question. However, the pedicle which formed a cord passing up under the body of the hyoid bone in the location of the thyroglossal duct, showed the thyroid origin of the cyst.

In the second case the entire thyroglossal duct, expanded to a cyst in its middle, was present to prove the correctness of the diagnosis.

Report of a Case of Large Osteoma Involving the Right Frontal Sinus and Uncovering the Adjacent Brain.

JOHN F. BARNHILL, M. D.,

INDIANAPOLIS.

This occurred in a girl of sixteen years who first noticed a swelling on her forehead a year previously, which caused no symptoms, but was increasing slowly in size. The speaker was consulted because of deformity.

X-ray plates showed an oval tumor involving the right frontal sinus, with absorption of the external and internal plates of the sinus walls.

Operation August 21, 1917. An area of half an inch in circumference was wanting in the frontal wall of the sinus, and through this the hard glistening tumor presented.

The remaining portion of the frontal wall was removed by rongeur and the tumor forcibly pried out by stout bone rasps. It was attached to and extended into the infundibulum. The dura was exposed and absorbed over a large area. Some softened bone about the margin of the dehiscence was rongeured away, a light sprinkle of iodoform powder applied to

the exposed dura and brain. The infundibulum was enlarged by means of a bone rasp, a drain tube inserted, the cavity was lightly packed with sterile gauze and the external wound completely closed.

Recovery with but slight scar was entirely uneventful.

The tumor was an osteoma, weight a little more than six hundred grains, with great density.

DISCUSSION.

DR. JOHN M. INGERSOLL, Cleveland: At the meeting last year I showed some radiographs of an osteoma of the frontal sinus in a boy fourteen years old, following a blow from a baseball. He has been under observation for three years. During the first year after the operation I was very hopeful, but the radiographs that I exhibited last year showed a recurrence and that the osteoma had grown back into the brain cavity so far that it was inoperable. The tumor grew originally from the infundibulum into the frontal sinus, just as it did in Dr. Barnhill's case. The general opinion is that the tendency of these growths to recur is very marked.

We have now under observation, at Lakeside Hospital, a man who has an exophthalmos, one eye being pushed downward and forward by an osteoma growing from the external part of the orbit. The X-ray taken two months ago, compared with one taken recently, shows that the osteoma is slowly increasing, but with the known tendency of these growths to recur rapidly, we have hesitated to operate.

DR. JOHN E. MACKENTY, New York City: In the service at the Manhattan Hospital, in another department, I was interested in an osteoma of the frontal bone. It involved the frontal sinus and extended back along the base of the brain, going through to the dura. The condition is pretty well recognized under the name of ivory osteoma of the frontal bone, and it is rather serious to operate on it. This man's was due to syphilis. He had evidence of syphilis at the time. I should like to ask Dr. Barnhill whether this girl's blood was examined for syphilis. The man subsequently died of meningitis. His tumor was not operable. The consensus of opinion is that when these tumors are very large, they are inoperable because the difficulty of getting them out entirely is so great.

DR. JOHN F. BARNHILL, closing: She was an only child. There was no evidence of hereditary syphilis, and I looked on her as a perfectly well girl except for this ivory-hard tumor. I should be greatly amazed if this should turn out to be a sarcoma. I am well aware that sarcoma is more common in this region than anything like one. I should be greatly astonished if it returned. When I pried it off, it snapped from the infundibular attachments with a crack such as would a piece of marble, and in sawing through it was so ivory like that it could be compared to a billiard ball. There was no suspicion on the part of anyone that it could be sarcoma, but I know the tricks of sarcoma so well that I would not say that it is impossible for it to have been one.

Report of a Case of Prolonged Intubation.

EMIL MAYER, M. D.,

NEW YORK CITY.

A boy aged nine years had had diphtheria at the age of two, for which tracheotomy was done, resulting in a tracheal fistula, for which he was admitted to the hospital. Attempts to close by this plastic operation failed, with the result that a tracheotomy tube had to be inserted.

Stenosis of the larynx followed, which was treated by divulsion, with subsequent introduction of an intubation tube. This tube had to be removed under suspension and promptly reinserted at intervals for a period of five years, always under general anesthesia. Finally in April, 1918, the intubation tube was removed. A tracheotomy tube was inserted for a couple of days. This was removed, the wound closed, the patient breathing since through the natural passages. The writer concludes:

The special points of interest in this case are:

1. Persistent remaining of a tracheal fistula in spite of every faithful attempt at its closure.
2. A stenosis of the lower portion of the laynx due to contraction of the natural parts, and their consequent disuse.
3. The impossibility of intubating except under general anesthesia and under suspension.
4. Persistent collapse of the larynx as soon as extubated.

5. The prolonged wearing for five years of an intubation tube.

6. The ability to breathe through the natural passages after all these years, in spite of the loss of at least two anterior rings of the trachea.

To this happy outcome must be attributed, in great extent, the growth of the patient, who, from a little boy of nine, and four feet in height, is now nearly fifteen years old, and has attained a height of five feet five inches, with natural increase in size of all his organs, including the trachea and larynx.

DISCUSSION.

DR. HENRY L. SWAIN, New Haven: I should like to inquire as to the development of thyroid and cricoid cartilage, notwithstanding their disuse—do they grow in the normal way?

Answer: Yes.

DR. JOSEPH H. BRYAN, Washington: It must have taken long continued, patient work.

DR. THOMAS H. HALSTED, Syracuse: I hoped that Dr. Mayer would help me out on a case that is at present under my care. Three months ago I was called to see a child a year old which had had a mild laryngitis for several days. A general physician was in charge of the case. One night the dyspnea became worse, and I was called in. I found the child cyanosed and the dyspnea very great. Examination revealed nothing. I had the child sent to the hospital, and went there myself in my car, after telephoning for them to have the instruments ready for immediate intubation. The tube was put in immediately and a culture was made and found negative. Antitoxin was given on general principles. At the end of six days I removed the tube, but had to put it back immediately and make artificial respiration. We gave this child antitoxin during the first few days. The throat was examined repeatedly, but the culture was always negative. It has been three months now, and during this time I have extubated eight times and intubated nine times. I did a direct laryngoscopy a month ago, and found nothing but an ashy appearance of the trachea, resembling a pseudomembrane. I did not do a bronchoscopy. We sus-

pected the existence of a foreign body, and the child has been X-rayed several times, always without result. The child is perfectly well otherwise, and has gained in weight. It walks about and enjoys itself, and has no difficulty in swallowing, but I do not know how to get rid of the tube. The grandmother wants me to say that she believes that it was all due to teething. I do not know. The child has had one very slowly erupting tooth, one of the molars. It has been exceedingly painful. It has taken that tooth, which looked as if it were ready to erupt when the thing happened, until now to come through, and in the meanwhile a number of other teeth have erupted.

Dr. Charles W. Richardson, Washington: The case of Dr. Mayer's is a very interesting one. In former days, when I did a great many intubations, I occasionally met with some prolonged retention of the tube, but I think that Dr. Mayer has the record for long retention of the tube, and I wish to congratulate him on surmounting his various difficulties, especially after the loss of part of the cartilage.

May I ask whether he does not think that there was some regeneration of the cartilage later on, which caused the box of the larynx to stiffen up so that its firmness made it possible for him to eventually take out the tube and dispense with it entirely? That seems to me to have occurred in this case.

Regarding Dr. Halsted's case: Some few years ago I reported a series of cases of laryngitis hypertrophica subglottica acuta, and I should judge from what he describes that it was a case absolutely of the same character. Such is the usual history of these cases, as he describes and as I have seen them. They are usually very intractable with regard to the removal of the tube. They have in the past given me more trouble than the fewer retained tubes in diphtheritic cases, as you would naturally expect on account of the fact that the urimary trouble in these cases is subglottic in the cricoid region. Of course, when I took out the tube in these retained cases the stenosis immediately recurred or soon thereafter. It takes some time to get rid of the tube. I should not worry about it, but keep on in the same way he is now following. I have had cases last three or four months before eventually being able to dispense with the tube.

Dr. Henry L. Swain, New Haven: I presume that Dr.

Halsted adopted the method of giving large doses of an antispasmodic before attempting to take the tube out. That is often successful. You can then remove it, when you would not be able to do so if the child was in possession of all his reflexes. I have had exactly the same kind of case as Dr. Halsted. In fact, there are three in the hospital now. One is just like this, and the others are retained tube cases. I have had trouble to get rid of them. I am sorry that I forgot Dr. Richardson's suggestion, and I think that this explains the situation perfectly. However, I did try to look upward in one of the cases. I was called in consultation and thought that it would be a good thing to do a tracheotomy and take the tube out. At the time of the operation and later, I tried to look in from below and see the condition of the larynx and find out what its interior contained, but without success. Some time after the tracheotomy this child had a sudden choking fit and died. We could not explain the matter, unless it was general uremia. The other children got well, but in these we had almost to stupefy the patient before we could get the tube out and have it stay out. In one case we had to keep the child under the narcotic for a whole twenty-four hours. These two children are all right now.

Dr. Emil Mayer, New York City, closing: Replying to Dr. Richardson's question, I would say that perhaps there was not so much reformation of cartilage, but that on account of the long continued presence of the tube all the tissues about the trachea became as hard as whipcords. So we had almost bony ridges on each side, which served to prevent the collapse that surely would have occurred from the falling in of the soft parts.

Regarding the case that the chairman presented, it does seem that an acute laryngotracheitis of some kind was the original cause requiring intubation. Dr. Lynah, in a masterly paper on "Prolonged Wearing of Intubation Tubes," recently called attention to the immediate collapse that takes place in many instances when the tube has been removed, requiring a hasty reintubation. In fact, he tells of a case in a boy who was extubated and returned to the ward. The boy was under the impression that the tube was still in situ. He was kept in the hospital for some time, and every time he misbehaved they threatened

to remove the tube and he immediately behaved. The tube was not there, but he thought it was. I would suggest to Dr. Halsted to introduce a much larger intubation tube next time, and when he does extubate to have the patient under some opiate, so that the general reflexes would cease, watching over him for that time of immediate danger and the likelihood of having to do a tracheotomy.

Regarding the question of Dr. Swain, as to whether the patient did not receive quantities of antispasmodics, I would say that the boy was never extubated except under general anesthesia. He has been receiving an eighth of a grain of morphia, and then being completely anesthetized while the tube was removed for cleansing, and this latter had to be done in a hurry. He has been anesthetized over twenty-five times, and each time the anesthesia became more difficult because he was pretty well soaked with the drug. I hope that we shall not have to do any more for the little chap because he has been very brave. It certainly was to me a most interesting case, and one of the most important deductions that we can make is the wonderful tolerance of the larynx. The keeping of a tube in a larynx for a month's time seems to make no difference to him.

The Surgery of Laryngeal Malignancy.

HUBERT ARROWSMITH, M. D.,

BROOKLYN.

From the author's observations of MacKenty's work and his own recent experience, modeled very closely thereon, he is inclined to tentatively suggest the adoptions of Moure's antecedent tracheotomy, to accustom the lower air passages to the direct impact of air, which may lessen their immediate postoperative irritability and susceptibility; the tracheal opening to be made high, as Jackson has indicated, because that will not interfere with the later mobilization of the trachea. Otherwise the two step operation seems to offer no special advantage. This is the ideal field for the employment of oil-ether colonic anesthesia, as devised by Gwathmey. It makes the whole procedure infinitely easier for both patient and

operator. Even if really painless under local anesthesia, such an ordeal produces an enormous apprehension which cannot but be detrimental to the patient, and the degree of infiltration of the tissues necessary to produce insensitiveness must interfere with their repair. With rectal anesthesia laryngeal spasm does not occur, bleeding is very much less, there is no tracheobronchial irritation from the directly inspired anesthetic, which very largely obviates the necessity for subsequent repeated applications of the suction apparatus—in itself an agent of some danger—and there is much less likelihood of postoperative vomiting, most undesirable under these conditions.

The laryngologist for every possible reason is the man who should do laryngeal surgery, both external and internal. If he saw all these patients at an early date, thyrotomy would more often be performed.

Laryngectomy cannot be repudiated on any such grounds as the mutilation, or the loss of voice. Laryngectomized patients are in no worse case than the blind, the deaf or the helplessly crippled. Many of them seem to get a fair amount of happiness out of the mere fact of existence, and are not by any means incapable of self support. In judiciously chosen cases this operation offers a good deal more than a probability of clinical cure, and in most instances a definite retardation of the fatal ending.

Of two cases operated by the writer, one died six weeks later of pneumonia. The other is in good condition, now six months after operation, and at work.

A third case in whom only a tracheotomy was done, his final sufferings were so great that the author regrets that he did not give the patient "a fighting chance by as farreaching a dissection as possible," rather than witness such sufferings as this man endured during the last six months of his life.

DISCUSSION.

DR. JOHN E. MACKENTY, New York City: The main trouble is that the cases come to us too late for any hope of permanent cure. Of twenty-three cases seen by me since last September, seventeen were inoperable, except in the way of alleviation. Only one case of the twenty-three was incipient.

Now, that is a terrible commentary on the present condition of the diagnosis of this disease. There is a fault somewhere, and, as Dr. Arrowsmith says, I think it is largely with the general practitioner, who does not take notice of the early symptoms. Anyone of cancer age complaining of hoarseness which lasts for more than six weeks should be under observation. There is no question that the mortality has decreased during the last few years. Up to seven or eight years ago it was very high. At the present day, those taking this work up have a different experience, and find the operative mortality much lower. I think that care in the technic will reduce the operative mortality to a very small fraction.

Partial laryngectomy is an operation seldom required. I have added no cases of this procedure to the former record. I have seen none requiring it. Besides, hemilaryngectomy is more dangerous as an operative procedure than total laryngectomy. I think that a lot depends on getting the cases over the surgical end of it, on the postoperative treatment, more than we realize; it is the neglect of the small details following operation that produces the mortality.

I am wedded to the one stage operation, but I am not prejudiced, I hope, and see some reason now in the use of the high tracheotomy that does not in any way injure the trachea. I object to the other because it injures the trachea.

I have been impressed by Dr. Arrowsmith's exhibition of colonic anesthesia. Having seen it used in this type of operation, I am going to give it a thorough trial. I believe that in colonic anesthesia we have made an advance in this work, because it lessens the amount of hemorrhage and of blood getting into the trachea, which I consider very important in guarding the patient against pneumonia.

Dr. Cornelius G. Coakley, New York City: It would seem to me that a one-stage operation is, in some cases, much to be preferred to a two stage operation. If the growth is small, and you can afford to wait for the adjustment of the respiratory tract to the new method of breathing, all right; but if the case is likely to result in total laryngectomy the one stage operation is to be preferred.

Dr. Robert Clyde Lynch, New Orleans: I have now six cases of intrinsic carcinoma of the larynx that I have oper-

ated on under suspension. Four of these patients are perfectly well at the present time. In the remotest case, it has been four years since the time of operation; in the most recent, about eight months. So far, there has been no recurrence, but I want to be sure that you understand that it is not good advice to give you at this time to operate on cases of intrinsic carcinoma of the larynx by that means. I am afraid that some men might think that this is an operation of choice and do it, and thus do more harm than good. In the second place, it would seem to me that as we progress along the line of study of operation for carminoma of the larynx, the operations are going to divide themselves into two types —the thyroidotomy and the laryngectomy types. The cases requiring hemilaryngectomy will, very likely, give much better results under total laryngectomy. I have had seven cases with five cures and no immediate deaths, within ten days from the operation. The recurrence taking place within ten months in the shortest time. That is, the patients who got the least benefit from the laryngectomy lived ten months, and in this particular case he was especially grateful for this added period to his life, in order to wind up his affairs so that he might leave them in shape for his family. Five of these patients are perfectly well up until the present time. Three of them are farmers who have been through three crops. That is, they have planted and harvested their crops three times, and their families have been provided for by that means. The others are clerks, and all are particularly happy and grateful. All can do without pad and pencil, in that they have been able to develop a type of speech that is understandable by their associates.

My procedure has always been by means of a preliminary tracheotomy, and at first low down, but now high up. I have not seen any cases in which the tumors have grown so large within two or three weeks following the tracheotomy as to make me feel that the tracheotomy itself had jeopardized the patient's welfare as far as his recovery was concerned. Giving always the ether vapor anesthesia, and giving the vapor through the tracheotomy tube has certainly facilitated every manipulation during the operative procedure. I now take away with the larynx the superficial thyroid muscles, the

sternothyroid and sternohyoid, that group of muscles overlying the anterior face of the larynx.

I first started rectal feeding after the operation, but that has been supplanted by the use of the nasal tube or the introduction of the small catheter, just as one would do with a stomach tube, keeping the end of the catheter out of the stomach; that is important, in order to get away from the nausea or postfeeding vomiting. The tube should be inserted down to the neck, so that the esophagus may take care of the swallowing to the stomach.

The method of the care of the trachea, to me, has seemed very important. I pare the trachea and larynx, and attempt to separate at one point the trachea from the esophagus, and then I put in a tape, so that I may hold the trachea up until it is bent in that fashion. When things are ready I cut the trachea from above down, and the only bleeding that occurs is from the mucous membrane of the trachea. Before the trachea is cut a heavy silk suture is put in and held by an assistant. This prevents any blood from going down into the trachea. The anesthesia is carried on through a very small tracheotomy tube, which lies in the opening, and is also under the care of the assistant, who steadies the trachea. He has nothing to do but be sure that nothing enters the trachea. I do not know whether that is what keeps us from pneumonia or not, but we had no postoperative disturbance, and the remarkable gain in weight and the comfort that these people enjoy after the removal of the mass make it well worth while. It does seem to me that laryngectomy is not nearly so bad a thing for the patient as one would gather from reading the older articles on these subjects.

Dr. Harmon Smith, New York City: The reader of the paper cited a report of a case made by me. Last week I saw the woman. Her voice has returned, and she has gained in weight, although that was not necessary, as she weighed two hundred pounds to begin with. I believe that it was of low grade malignancy, of a papilloma carcinomatous variety.

Dr. D. Bryson Delavan, New York City: Yesterday morning I exhibited to a number of members of the society a patient who had been operated on by a friend of mine in New York City twenty-one years ago, two-thirds of the larynx

being removed, and he is perfectly well today. That is one of the few cases followed and the end results studied.

DR. HUBERT ARROWSMITH, Brooklyn, closing: The plea I make is one of the utmost importance. If we are going to reach conclusions we want to know what becomes of the patient. Perhaps we do not all realize that our distinguished honorary president, Dr. Solis Cohen, was the originator of this method of handling the stump of the trachea, an invaluable step in the after treatment of laryngectomy, and I think that he was the first to do a laryngectomy in America.

DR. J. SOLIS COHEN, Philadelphia: I was not the first to do a laryngectomy, but the first to report the case.

A Carcinoma of the Epiglottis and Root of the Tongue Removed by the Simpson Radium Needles, With Description of a Needle-Placing Instrument.

OTTO T. FREER, M. D.,

CHICAGO.

Dr. Frank Edward Simpson of Chicago in 1914 devised short, hollow needles one and one-sixteenth of an inch long and one-sixteenth of an inch thick, made of steel and platinum plated with gold, the cavity of the needle being packed with twelve millimeters of radium sulphate, which is sealed within the needle after the detachable eye portion of the needle has been screwed down upon its hollow shank. The wall of the hollow needle is three-tenths of a millimeter thick —thick enough to filter out the irritating alpha and softer beta rays, while permitting the hard beta and gamma rays to pass freely through the wall of the needle.

The needles are stout enough to endure the firm grasp of a needle holder for their introduction into the tissues.

With several Simpson needles the effective socalled cross-firing of radium rays may be produced—that is, instead of the radium rays proceeding from a single source in the center of a growth it is easy to place a number of needles at its periphery as well as in the center, so that not only is the growth evenly influenced by multiple radiation, but the apparently healthy zone about the tumor is deeply penetrated by the rays, so helping to prevent a local return of the growth.

A valuable quality of the needles is their comparatively easy insertion, so that only occasionally, where a tumor is tough and resistant, is it necessary to place them in a preliminary knife cut, for as a rule they may be directly thrust into the growth.

It is generally agreed that malignant tumors should be destroyed at one sitting by one very large dose of radium. This is not only done in order to minimize the danger of metastases risked by waiting for the effect of lesser doses at intervals, but it is experience that the effect of a single large dose is proportionately greater than that of the sum of smaller ones that equal it in quantity. It has also been found that a tumor is less influenced by later doses than by the first one, a species of tolerance being established for radium. The demand for a single completely effective large dose of radium rays is filled by leaving the Simpson needles in place for from nine to twelve hours. Their efficient screening prevents the undesirable integumental burns that were so common before it became known that the soft beta rays and the alpha rays must be filtered out.

The difficulty in accurately inserting the needles with forceps in this case, the roughening of the surface of the costly needle by the blades and the annoyance caused by the dragging thread that trailed the needle, led the writer to construct a needle placer for inserting the needles, a device which in the case of a carcinoma of the laryngopharynx just treated has permitted their exact introduction into the flesh with an accuracy and ease that, he thinks, will make it possible to needle even intrinsic carcinomas of the larynx by the indirect, mirror method of laryngoscopy, a method so much less distressing to the patient than direct or suspension laryngoscopy.

Observations on Pneumococcus Infection of Nasal Accessory Sinuses.

CORNELIUS G. COAKLEY, M. D.,

NEW YORK.

One hundred and eighty-eight cases were observed. The acute ones with the history of a duration of one month or less numbered one hundred and nine. The remainder were chronic.

Pneumococci were present in forty-four per cent of the acute cases, and in most of these they were the sole organism. In the chronic cases this organism was found in but thirteen per cent.

These results seem to warrant the inference that in acute inflammations probably half the cases might be due to autoinfection, while the other half were due to infection from some outside source.

In the chronic cases the larger number were accompanied by autoinfecting organisms.

The author records a case of pneumococcus tonsillitis followed at an interval of two weeks with a pneumococcus infection of the left antrum. In the second case both antra were successively involved, one at a later period than the other, with a pneumococcus in each instance.

The third case had beginning infection in the larynx and trachea, secondarily involving his antrum, with pneumococci.

The fourth case had a bilateral maxillary sinuitis; there was a pure culture of the pneumococcus in both. Signs of consolidation were found at the base of the right lung next day, and antipneumococcus serum was administered, followed by a chill, rising temperature to 106°, and an immediate drop in the temperature with pneumococcus in his sputum, without any further attention to his antra, as the patient was too ill to be treated. Spontaneous recovery followed.

The writer asks what rôle the serum played in curing his maxilliary sinuitis?

The fifth case recorded was the wife of the preceding patient, with pure culture of pneumococcus from the discharge, evidently following infection from her husband.

The sixth case was one of an acute otitis with pure culture of the pneumococcus arising from an infection of the same character in the left antrum.

From a study of this series of cases the writer feels justified in drawing the two following conclusions:

First.—Pneumococcus infection of the nose and its accessory sinuses does not in any large percentage of cases result in a pneumococcic infection of the lungs. Only one of our cases developed pneumonia.

Second.—There would seem to be direct evidence that in

one of the cases the infection, pnumococcus I, was transferred from husband to wife.

We hold that most severe acute rhinitis attacks are the result of infection, either with autogenous or foreign bacteria or viruses. The presence of pneumococcus rhinitis and sinuitis during the stage of profuse secretion, accompanied by coughing and sneezing, must be a fruitful source of disseminating pneumococci, some of which may only invade the upper air passages of the victims of the infection, while in other patients, finding a suitable soil in the deeper air passages produce a pneumonia. There is abundant evidence that pneumonia is infective, and may not one source of infection be in these pneumococcic head colds?

DISCUSSION.

DR. CLEMENT F. THEISEN, Albany: Some time ago I published a paper on "Pneumococcus Infection of the Nasal Cavities in Children," which was based on a small epidemic that I witnessed in the Child's Hospital in Albany. In these cases the children ranged from four to fourteen years of age, and numbered not over half a dozen. We obtained in all the cases the pneumococcus from the nasal secretion. In two cases there was a marked exophthalmos with serious ethmoidal and frontal involvement. These two children were operated on and made good recoveries. We had one death, in a child of four, with sinus involvement and a high temperature. Pneumococcic serum was administered without effect. In all the cases there was profuse nasal discharge, very high temperature and very serious involvement of the cervical lymphatics, and the pneumococcus was obtained in pure culture from the nasal secretion.

DR. HENRY L. SWAIN, New Haven: I had three cases this winter in which the pneumococcus Type 1 was found, and in which the immediate onset of pneumonia necessitated the calling in of an internist, in order that the necessary attention might be given to the chest condition, so that I could not follow the case for a number of days. Two of the three cases recovered and one did not. The sinus condition absolutely cleared up within three days after the administration of the pneumococcic serum in those that recovered.

DR. CORNELIUS G. COAKLEY, New York City, closing: The only case in which the question of giving pneumococcic serum of Type 1 was the one in which the serum was very efficacious. I was surprised to find that from such a severe attack the patient recovered from his sinuitis without further treatment. Of course, they might have recovered without it. Some recover without treatment.

The Diagnosis and Prognosis of Hypertrophic Sphenoiditis.

GREENFIELD SLUDER, M. D.,

ST. LOUIS.

Of the utmost importance is the kind of light to be used in postnasal examinations. Sunlight would be ideal were it not for the great heat conveyed which renders it useless.

The light made by Leitz under the name of the "Lilliput Arc Lamp" is as satisfactory as the sun and always available. The carbons meet at right angles and give a brilliant white light which is condensed into a pencil by a convex lens. It is a different light from that of the arc lamp used in street illumination. In burning, a little white smoke is given off, which condenses to a white powder, indicating that the carbons have been impregnated with a zinc salt which may be the way in which the white light is made. Leitz declines to tell the process of manufacture.

The advantages of a proper light are obvious, in that diseased conditions, as also the presence of a small amount of pus, are the more readily recognized. At times the Holmes nasopharyngoscope is of the utmost help by virtue of the right angle vision.

The author presents a clear description of the normal post-ethmoid-sphenoid district.

All changes in these parts should be carefully noticed, because a very slight surface change is often accompanied by much more advanced and serious change in the deeper parts, as is often shown by the finding of polyps within the cells at the time of operation, no evidence of which was previously recognized there. Patches of inflammation may often be found with the pharyngoscope within the cells which are very

pernicious and disastrous according to their location, for example, upon the optic canal.

He does not believe that the postethmoid sphenoid operation is free of danger in the hands of any rhinologist. He has seen the eye, which it was intended to save, lost for the vision it had at the time of operation, and he had learned of death following a number of these operations. Sometimes a sphenoid sinus makes the inner part of the canal, and sometimes the postethmoid makes it, and there is no way to tell in a patient at the time of operation which it is, hence the sure practice is to do the combined operation.

The distribution of the hyperplastic process here is of great interest and various.

The presence of pus is not the only indication of diseased conditions here, as there may be active inflammatory conditions without it. The author calls attention to the appearance of the epithelium under different conditions. With a proper light, when pus is present it is almost invariably greenish yellow or yellowish green, whereas the opaque epithelium is white or very slightly bluish white.

This form of sphenoiditis is rarely unilateral. Anomalous anatomic arrangements of these parts exist, and failure to bear these possibilities in mind may defeat our best technical efforts, and these anomalies are described. The diagnosis becomes exceedingly difficult in children.

As to prognosis, the infection "coryza" in these parts may be of grades so slight that the patient is not cognizant of it and still make the ocular or the painful lesions. The acutely inflamed area may, however, be seen with the pharyngoscope after the cells are opened. And for the second class of cases the prognosis is also for relief, but it must needs be slower and less complete, although in the long run the result is preeminently worth the effort it took to get it. These cases have seemed to be less disturbed by coryzas.

The postethmoid sphenoid radical operation, properly performed in the first class of cases, almost always gives a technical result that remains satisfactory—that is, the openings of the cells remain as the operator makes them. In the second class they almost always get smaller, and very frequently close

up completely, and so must be made again, often several times.

In later life an involution of the hyperplastic changes—rarefying ostitis—takes place. Sometimes beginning about the fiftieth year and sometimes later. The author has seen this in unoperated cases accompanied by corresponding cessation of symptoms (in one case an ophthalmic migrain).

The Value of the Dichloramin-T Chlorcosane Solution (Dakin-Dunham) in the Treatment of Infections of the Upper Air Passages.

D. BRYSON DELAVAN, M. D.,

NEW YORK.

Dichloramin-T, the basis of the Dakin-Carrel fluid so extensively used as an antiseptic in a wide variety of infectious conditions, has an intense germicidal action corresponding to its high content of chlorin. It is difficult to find for it perfectly satisfactory solvents which will yield stable solutions. Drs. Dakin and Dunham state that the best medium thus far found is an oil obtained by the chlorination of paraffin wax, to which has been given the name "chlorcosane." Other solvents experimented with are a mixture of eucalyptol and paraffin oil, and a heavy oil obtained by the chlorination of eucalyptol. Eucalyptol has been found to be irritating. Chlorcosane is not irritating and has seemed decidedly preferable. Explaining the action of dichloramin-T in oil, Dr. Dakin says that antiseptics incorporated with or dissolved in oily substances usually possess little if any antiseptic activity because intimate contact with the infected matter is hindered by the oil. When, however, the dichloramin-T solution in chlorcosane are brought in contact with aqueous media the partition coefficient between the oil and the water is such that a certain amount of the dichloramin-T passes into the water and there exerts its germicidal action. The amount of the dichloramin-T thus passing from the oil is increased by the presence in the aqueous medium by substances capable of taking up chlorin. So that the oil solution seems as a store for the antiseptic which is drawn upon to maintain the germicidal activity of the aqueous medium with which it is in contact. The dichloramin-T

oil solution may be sprayed upon wound surfaces or poured into accessible parts of deep wounds. It yields moderate amounts of the antiseptic to watery media, such as secretions from wounds or mucous membranes. It is suitable for sores requiring prolonged antiseptic treatment and for first dressings of wounds which do not require irrigation. The application of the oil is extremely simple, and generally it need not be renewed more than once in twenty-four hours.

Admitting the germicidal power of dichloramin-T, it is desirable to study its value in the disinfection of septic conditions of the upper air passages, regions especially liable to infection, prone to harbor germs of dangerous character, abounding in recesses difficult of access by the ordinary means of application, and often becoming foci of infection threatening extreme danger. This is especially true of the upper nasal region, the vault of the pharynx and the tonsils. The dichloramin-T may be used to advantage in these regions under three different conditions:

1. To prevent the extension of newly acquired infection.
2. To overcome the acute results of infections, and
3. To abolish the bacilli persisting in carriers.

The success of the method must depend upon the thoroughness of the application of the disinfectant. Brushing the surface of the tonsil or spraying the lower section of the nasal cavity cannot possibly be effective. A spray atomizer must be used which will carry the spray in all directions, upward, downward and sidewise.

The crypts of the tonsil must be disinfected to their lowest depths, and the superior half of the nasal cavities must be thoroughly reached. To effect this the following principle must be recognized and carried out: The parts must first be cleansed, and then exposed to the fullest extent by the application of adrenalin or some similar astringent, and finally the dichloramin-T oil sprayed into them until every crypt and recess has been completely reached. This thoroughness is absolutely necessary in order to secure the removal of the most deeply seated germs.

Used in the strength of two per cent or less, the solution with chlorcosane is not irritating, although stronger solutions

may be. Suitable atomizers are necessary. The success of this method has thus far been gratifying.

Where this method fails, in the presence of hypertrophied tonsils or adenoids, the removal of the latter may be necessary to effect a final cure.

The desire of the author is to furnish a method so simple in itself as to be readily carried out by the average practitioner, with the aid of apparatus inexpensive, durable, clean, compact of form, light of weight and therefore available for use under all circumstances of medical practice, whether civil or military.

The essentials to success are:

1. Recognition of the principle of the necessity for the complete exposure of the centers of infection.
2. The use of a proper spray atomizer.
3. The devotion of sufficient time and care to the effective carrying out of the treatment.

DISCUSSION.

DR. JOSEPH H. BRYAN, Washington: I believe that this method of treatment is going to be of valuable assistance to us in correcting these conditions. I cannot understand how the spray can get into the deeper portions of the tonsils, however. I have been using a small dental syringe, by which the solution can be carried into the depths of the tonsil better than by the spray.

DR. ROBERT C. MYLES, New York City: I have been experimenting for several months with these preparations of Dr. Dakin's fluid, although nothing definite has resulted A great many of the cases seemed to have been relieved, and it would seem theoretically that it is the best thing that has been proposed. I have used it in solutions and mixtures, and the difficulties in reaching the depths of the crypts need, I might say, some consideration. Many of us have been trying to swab out the depths of the crypts and have always produced a certain amount of hemorrhage on account of the delicate structure of the parts, leaving a blood clot to be a culture medium for the germs. I have used also the watery solutions in tracheobronchial conditions, and so far the results have been very satisfactory. I do not believe that I have a case which apparently was pneumonic that has not stopped. When the

oily solutions were used a great deal of precaution was observed in dropping them into the trachea, and spraying came in readily with the watery solutions. I preferred the latter, on account of my faith that too much paraffin oil going into the lower bronchi might not be brought back again. Not being observable, it was a question what would become of it.

Dr. Cornelius G. Coakley, New York City: Chronic meningococcus carriers in the Rockefeller Institute were examined one afternoon by myself. The conditions found were almost identical in all—a most intense hyperemia, redness, with moderate swelling of the nasal, nasopharyngeal and pharyngeal mucous membrane. I have never seen such red throats, and none had had during the past four days any other local treatment so that I could not find any conditions there that were the result of local treatment. Of the twenty-seven, twenty-four had perfectly enormous masses of adenoids in the nasopharynx. I have rarely seen such masses of adenoid tissue in adults. They were great big husky men from the Middle and Far West, fine specimens of manhood, yet with masses of adenoid tissue bigger than my thumb, as proved by removal by Dr. Babcock later. In twenty-four that was the size. In two there were smaller amounts, and in one, none. One patient had a sinus involvement. I feel that neither the dichloramin-T nor any other local disinfectant can have any great bactericidal or germicidal value when we find such masses in the nasopharynx as were present in these twenty-four cases. I believe that this was the cause of continued finding of the meningococcus. The results of operation will be noted later on. Last fall I had a smaller number, about ten, who were sent from one of the cantonments of the South to the Rockefeller Institute for study, and we found in all large tonsils and adenoids. When these were corrected, they promptly cleared up in two weeks, and they were long standing cases. So I think from what little I know at present, that if you have a smooth surface which can be readily acted on by the antiseptic, dichloramin-T, you will get good results, but if you have a rough surface its efficacy is much less.

Dr. Harmon Smith, New York City: I have had more or less success in employing this solution, beginning with dichloramin-T chlorcosane, in February. I believe that the most

important point is to have the surface clean and the sinus clear of any invading pus or mucopus found there. In addition, we should not only bring the solution in contact with but force it into these rugæ. I have shrunken the tissues down first, and then irrigated with an aqueous solution of some alkalin or normal saline, and afterwards instituted suction until there was no evidence of pus in the solution coming away. Then I have employed a syringe, which I have endeavored to impress on some as being efficient. It is loaded as an ordinary syringe, with a two per cent solution of dichloramin-T. Then, by turning the stop cock, I bring about a vacuum in the sinus, after which I turn the cock and force the solution in, using the vacuum together with the force of the syringe to force in the solution. I have had more success with the dichloramin in oil than with the aqueous solution. This method has been more or less condemned by some, and they may have their reasons for it, but in my hands it has met with considerable success. In addition to the treatment of the patient it is necessary for the patient to do something in the interim between the calls at the office. I give the patients a weak solution of adrenalin, with which they spray their noses first, and later with a normal salt solution they irrigate the nose until the first outpouring of mucopus is over. I also give them a bulb that will give, on the Sorenson machine, a ten degree registration on the dial. Employing this at home, they can keep the sinus more or less free from mucopus, and one then has less to get out in the office before employing the injection with the syringe.

DR. EMIL MAYER, New York City: My experience with this solution in oil many months ago was that it produced so much irritation in the cases of otitis that I was rather chary about its use in cases in which there was much sensitiveness of the mucosa, so that I have recently been using the watery solution in cases of bronchiectasis and bronchial abscess, washing them out, and at the same time using the suction apparatus, and then throwing in the watery solution. I took a number of the cases that were under observation and, for control, used the old solution of iodin and carbolic acid, and in the others I used the chlorcosane. The site of application is in the bronchus. Drawing out the very excessive secretion by means of

the suction apparatus, which was attached to a double tube, the irrigation could be continued while the suction was being used. Our experience has been of such short duration that I am unable to do more than report a decided amelioration of the worst symptom of the patients, the odor. Whether we can use a solution in oil in the bronchus remains to be seen. I will experiment later on, and hope to get better results with the oily solution.

DR. ROBERT CLYDE LYNCH, New Orleans: I have used dichloramin solutions, both aqueous and oily—the oily in two per cent as described. In the sinus cases, especially the antrums, a few of the sphenoid involvements and four broncho-sinus cases we irrigated the sinuses first with normal salt solution, following this by irrigation of the sinus with the aqueous Carrel-Dakin solution. Then we instilled into the sinuses—and antrum, frontal and sphenoid—thirty minims to a dram of the oily solution. This was naturally followed at first by an apparent increase in the inflammatory state of discomfort which lasted on an average for about six hours. On the return of the patient the following day, we washed from the sinus apparently more secretion, but it was usually changed in character. That is, instead of the secretion showing a tinge of blood or being bloody, there was on the patient's return what appeared to me to be an excess or an irritation of what would be a normal mucous membrane. In other words, the washing from the sinus lost the peculiar mucopurulent sanguinous type, and was changed to a thinner watery discharge having a considerable amount of apparently clear mucus. In the cultures taken from these washings there was a notable decrease in the diplococci, but the usual history of the time of clearing up of the sinus did not seem to be shortened to any great degree. In other words, running parallel cases, we found as the winter wore on, that we were able to accomplish almost the same results by irrigating the sinuses with a normal salt solution or with a solution of permanganate of zinc. We were able to accomplish convalescence in about the same time as with the dichloramin solution. We then tried simply washing the sinus with a plain tap water, following that with the instillation into the sinus, through the canula, of from one to two drams of two per cent dichloramin oil and allowing that

to remain in for as long as it would stay, requesting the patients to sit upright and refrain from blowing their nose. They apparently kept the fluid within the cavity for quite a considerable period of time—so much so that even on washing it out the next day you were able to detect distinctly some remaining odor of the chlorin. This plan was followed by the same reaction, but the convalescence in these cases was cut down apparently from two to four or five days. After the instillation of the first oil and the washing of the second day, we instill the oil for the second time. Then, if the symptoms were not too violent, we refrain from any further intrasinus medication. We did not try to wash the sinus out, but allowed the oil to stay in and gave the sinus a period of rest of about four days. In these cases the convalescence was shorter, the pain was less, and the patients came through in a most satisfactory manner. We used the dichloramin oil on tampons in cases of acute suppurative otitis requiring tympanotomy, and found that the first reaction was, as Dr. Mayer suggests, quite marked. The drum would be reddened, the canal would be reddened, but with a period of twenty-four hours of rest, the discharge would change in character from the serosanguinous discharge to one made not of blood but of an excessive secretion of what apparently was normal mucous. In other words, the secretion was white and clear. In the acute suppurative cases, some of them we felt were aggravated by the use of the dichloramin oil tampons, and we discontinued their use, not being able to accomplish the convalescence of the individual in any less time than we had by other means. We used the dichloramin oil in the acute tracheal cases, cocainizing the trachea rather thoroughly and introducing into it, by means of a tracheal canula or syringe, thirty minims to a dram of the dichloramin oil solution. This was followed in one or two instances by considerable spasms of short duration, but by very rapid amelioration of the symptoms. In other words, that peculiar dusky red, that intense redness of the mucous membrane, could be seen to be much less upon the next examination. The cough was less, the distress was less, and these cases of what we diagnosed as acute tracheitis cleared up apparently very much more rapidly by the use of the dichloramin oil than they did by other

means that we have been using before, but as far as the use in the sinus is concerned, we were not able to feel that we had been giving something which shortened the period of convalescence. In the ear cases, some of them were made worse, apparently worse, by the application and we discontinued its use. In the tracheal cases we saw real, decided benefit.

Dr. J. Payson Clark, Boston: I learned that it was important to avoid the use of any metal in the canula or syringe in its application. I should like to report one case of chronic pansinuitis in which all the sinuses had free discharge from them. In this case I used this solution. I washed the antra out, and the left sphenoid was involved. I washed it out with normal salt solution and boric acid, and irrigated the sinuses—the right and left frontal, the left sphenoid and right antrum—with a Dakin watery solution. The patient went home and had a headache and so much malaise that she went to bed. She absolutely refused to have me continue this treatment, although she was better the next morning.

CLOSING DISCUSSION.

Dr. D. Bryson Delavan, New York: Formerly when eucalyptol was employed, that solution was found to be irritating. For that reason Drs. Dakin and Dunham devised the "chlorcosane." Almost anyone with a little experience in chemistry can prepare it, but the Abbott Company furnish it under the formula of Dr. Dakin.

Regarding the important subject of disinfection of carriers, I know nothing that has come out on this subject better than the candidate's thesis of Dr. Friedberg in the last volume of our Transactions. Not only may the crypt of the tonsil contain the offensive germ, but it may penetrate into the tissues of the wall of the crypt to such a considerable depth that even when the disinfectant is brought into contact with the wall of the crypt it does not reach the buried microorganism. The disinfection of the sinuses, too, is a difficult matter. Friedberg believes that when infection has persisted for three or four weeks in spite of treatment, then operative measures are distinctly indicated. There may be some cases in which operation, however, does not seem expedient with them. If we can find a reliable disinfectant we are in a much better position than we should be without it.

JOINT MEETING OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION AND THE LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY.

The joint meeting began with a Symposium on Bronchoscopy, the first paper of which was one entitled "Localization of the Tracheobronchial Tree; Preliminary Report of a New Method," by Dr. Chevalier Jackson, Philadelphia, Pa.

The Bronchial Tube: Its Study by Insufflation of Opaque Substances in the Living.

CHEVALIER JACKSON, M. D.,

PHILADELPHIA.

1. In intrabronchial insufflation with opaque substances, in the living, we have a measure of the greatest usefulness in mapping out the tracheobronchial tree in foreign body cases in which a foreign body is far in the upper lobe bronchi or in other small bronchi that cannot be entered by the bronchoscope. A stereoscopic pair of radiographs will show the bronchi in situ in the living, and the bronchi can be followed in the fluoroscope.

2. The intrabronchial insufflation of dry bismuth subcarbonate, through the bronchoscope, in sufficient quantities to cast a shadow did not produce any untoward symptoms, and the bismuth totally disappeared from the lung by expectoration in twenty-four hours.

3. The insufflation of dry powders and the injection of opaque fluid mixtures through the larynx gives a degree of visibility of the trachea and larger bronchi in the radiograph; but the results are not as good as when the insufflation of a dry powder is done through the bronchoscope.

4. The method is available for an enormous field for investigation of the action of the living cilia, in health and disease, the lymphatic drainage of the lung, the mapping out of bronchiectatic and abscess cavities, etc.

Suspension as I Use It Today.

ROBERT C. LYNCH, M. D.,

NEW ORLEANS.

The patient lies flat upon the table with the head extended; the crane is attached as far back on the table as is possible, allowing only sufficient room to turn the handle which moves it horizontally; the vertical position of the crane will now be on a line with the patient's shoulders. The mouth is open wide by placing an ordinary mouth gag in the left angle of the mouth, and this is steadied by the assistant, who has only to keep the head extended in the middle line, there being no need for support, since the head is resting on the table. The hook is the same in its every detail as presented to you before, and we have done away with the long tooth plates and dental spoons. The gag of the hook, instead of being closed, is now introduced sufficiently open to permit a view of the tip of the spatula.

Instead of passing the spatula along the postpharyngeal wall, he now follows down along the base of the tongue until the epiglottis is seen, then it is lifted with the spatula just as one does in bronchoscopy, and by this time the short tooth plates will fall behind the teeth, when the gag is opened wide to fix the tongue and epiglottis. Now the hook is placed upon the crane and the worm gear joint turned to bend the hook slightly to an obtuse angle. The crane is lifted in the vertical to flatten the base of the tongue, and this will raise the epiglottis so that the larynx will come into view. If the view in this position is not already sufficient, then by moving the horizontal crane towards the head of the table will bring the anterior commissure into view far better and much easier than the old method.

This differs from the older technic in that the head is flat upon the table, and any untrained assistant can hold it steady, and the patient is not dragged over the top of the table as before, and the mouth is wide open with a gag giving plenty of room for the introduction. There is no necessity for the table to be cut, as has been described, nor for the projecting platform, since the crane is attached far back on the table be-

hind the patient rather than ahead of him. There is no danger of dropping the patient from the crane or from the spatula, since the head is not lifted from the table, or, if so, just enough to procure sufficient tension to flatten the tongue.

The view is much more natural, and, if anything, clearer and less distorted, since there is much less tension at the region of the hyoid bone and the base of the tongue. The vocal cords, instead of being stretched anteroposteriorly, are now more relaxed, as shown by the respiratory movement under ether, and by the tones emitted under cocain. This, of course, permits of more accurate dissection, especially when removing the small tumors, such as vocal nodules. One looks now down the spatula along the line of the trachea and can usually see the bifurcation, as is shown by the possibility of introducing a bronchoscope deep into either bronchus.

In the old way, one looked from below up along the spatula, and it was impossible to get the bronchoscope further down than the fourth ring of the trachea. Consequently, in this new position, there is really no need for a table that can be elevated, though it is always a comfort for any operative procedure. Finally, the patient will complain much less of after pain about the angles of the jaw, back of the neck and of headache. There is much less danger of pinching the tongue between the spatula and the teeth of the lower jaw, and it is much easier, more rapid and more accurate to introduce in this way than the old way.

Some Original Methods of Treatment of Laryngeal Stenosis.

SAMUEL IGLAUER, M. D.,

CINCINNATI.

For patients who are wearing a tracheal canula, the author follows the same principle which underlies the use of rubber tubes in laryngostomy, which has the advantage of being employed without the necessity of splitting the larynx.

The methods used are:

1. Dilatation by means of a rubber tube doubled upon itself. The length of the tube when doubled should approximate, as nearly as possible, the distance from the arytenoid to the upper margin of the tracheotomy. A string is fastened to the rubber

tube, which is wrapped clockwise about the stem of the tracheal canula, and then fastened to the patient's neck with adhesive plaster. This is to prevent the tube gliding past the tracheal canula.

Another string is allowed to protrude from the patient's mouth to serve as an extractor when the tube is to be changed. This method permits a certain amount of pneumatic pressure because of the air in the tubing.

The second method is the insertion of a single rubber tube from below. The third is intubating by traction.

In the latter two small holes are bored in the lower end of an intubation tube, one in its anterior and the other in the posterior surface of the tube. A stout silk cord is then passed through both these openings, while the head of the intubation tube is threaded in the usual manner.

Removing the tracheal canula, a cord is introduced through the tracheal opening until it presents into the mouth. This string is fastened to that attached to the lower end of the intubation tube. Traction is made with a guiding finger in the larynx, the intubation tube drawn down in position.

The diameter of these intubation tubes may be increased by stretching rubber over the tubes.

Finally, clamped Rogers intubation tubes may be employed.

DISCUSSION ON SYMPOSIUM.

DR. EMIL MAYER, New York City: While I have not tried the method Dr. Lynch described, it appeals to me in every way. Whereas in our old method we have hung up the patient and practically held the weight of his body on the teeth and the tip of the epiglottis, today that patient can, thanks to this method, rest on his back. Instead of hanging the patient up, we are really only opening his jaws. We are getting much closer to his larynx, and are able to go in farther. I have only words of praise to say of the method. I can understand that with the mouth wide open you are nearer and can see better to handle the patient with the fewest number of assistants.

I was particularly interested in the paper of Dr. Iglauer, as I had reported at the meeting yesterday the case of a boy who had worn an intubation tube for five years before I was

able to do away with it. I want again to call attention to the fact of the extreme tolerance of the larynx to manipulations of various sorts. I rather feel that I should disagree with Dr. Iglauer in regard to doing a dissection and making an open wound in the larynx, if you can divulse it in any other way. I have always been able, after a comparatively short time, to have the opening wide enough in the cases that I have seen, to put in the ordinary uterine dilator, either from above or from below, and preferably the latter, and dilate the parts without making any wound.

Again I should object to the leaving of any cord in the patient's mouth and fastening it to the cheek. Those who lived in the early days of intubation thought that they could help O'Dwyer by leaving the cord fastened to the intubation tube in the mouth, but the cord was either bitten through or pulled out by the child, and the attempt was abandoned. My experience is that a piece of rubber tubing fastened at the upper and lower ends acts as a balloon and can be introduced in the manner described, which is quite the manner that I use.

One other thing: I prefer to keep the rubber tube in situ, leaving a double end of cord and tying it around the neck, rather than fastening it to the tracheotomy tube.

The ingenious method of holding an intubation tube in position by drawing it down is one that I think is extremely valuable. The speaker described a method of slow intubation successfully used. During the Spanish-American war he was asked to look after a soldier who had been in the battle of El Caney. Lying on his face, he had been shot by a sharpshooter who was in a tree. When picked up the injured man was bleeding from the mouth, a piece of tissue was hanging from the mouth, and there was an abrasion over the eye. The diagnosis made at the field hospital was that it was a glancing shot and that the eye was not injured. He was put on the transport and sent to Bellevue Hospital, where a tracheotomy was performed. He was walking around wearing a tube, and some ladies asked Dr. Asch and myself to see what could be done. As soon as I looked into the throat I saw a hole punched in the soft palate, as though I had put in a punch and taken out a piece. I learned that the man had been shot from

above, the bullet going down through the maxillary bone, cutting the soft palate, smashing the thyroid cartilage, entering the esophagus, and passing out into the stomach spent, and finally passing per rectum.

I began slow dilatation, and finally got the larynx dilated so much that I thought I could introduce an intubation tube, but as soon as I put it in, the man got blue. I had an intubation tube made of the same external size, but with a larger opening and with an introducer that was hollow, so that the minute it got in, the man breathed through the handle, and I could intubate him for any length of time. In that slow way I could get the intubation tube into the larynx. I mention this method because some such things might arise in this present war.

Dr. Hubert Arrowsmith, Brooklyn: I cannot see how, referring to Dr. Jackson's method, in view of the fact of the little harm that was done in the old days by copious insufflations of powder into the air passages, a little bismuth could do lasting harm, and I should think that this method would be of extreme value in helping us out in these very uncertain and difficult to locate small foreign bodies. Since I heard Dr. Lynch speak of this in New York last fall, I have used this method continuously, and I can corroborate his statement concerning the greater facility with which the speculum is introduced, the infinitely greater comfort with which it is retained by the patient and the improvement of the operative field.

Dr. Joseph C. Beck, Chicago: I had a case of a man who had a lung full of coal. He showed a beautiful bronchial tree, and I made experiments with forced inhalation by means of the Billings inhaler of anilin dyes that are radiographically obstructive. This picture, which I am sorry to say I did not bring, showed that if not the insufflation, perhaps the forcible inspiration of radioobstructive substances that would be vaporized might be of some value.

Some of you may remember at the American Congress of Surgeons, that I was going to demonstrate suspension laryngoscopy in a patient under general anesthesia, and was unable to put his head over the edge of the table. Finally I succeeded, with the patient's head flat on the table, and thought that

made a bad job of the demonstration of suspension as then taught. The next day I asked this patient to bend his head back, and he said, "I never could; I have a stiff neck." I have employed this method, as demonstrated by Lynch, for a year. Three weeks ago I had a patient with a little growth in the larynx, of which I could not obtain a good view with the head on the table, but I succeeded very nicely with the old method, so perhaps there are some cases that would still be better handled with the old method. I do not know what was the reason—perhaps some anomalous condition about the hyoid bone.

The method that Dr. Iglauer spoke of, of using the full length intubation tube, I have used with satisfaction, and the new method that he has described today I will employ. I had a similar accident to the one he spoke of, in using the full length intubation tube. It did not perforate, but engaged in the wall of the trachea, and I had considerable difficulty in manipulating it. This method that he describes today will do away with some of these difficulties.

DR. HENRY L. LYNAH, New York City: Dr. Jackson has given us a great aid in bronchoscopic localization by his bismuth insufflation method, especially in difficult localization of small foreign bodies which do not show in the X-ray plate. I have used the bismuth esophageal capsule in many cases which did not show in the X-ray, and by this aid have been able to locate the foreign bodies and remove them.

As far as bismuth irritating the bronchi is concerned, there seems to be little discomfort about it. We have had two cases with tracheoesophageal fistula who complained of difficulty in swallowing. The diagnosis of tracheoesophageal fistula was made from the radiograph. After swallowing the bismuth meal there was a violent attack of coughing, and when the X-ray pictures were taken they showed the whole of the tracheobronchial tree in bismuth shadow. All of the bismuth was subsequently coughed out. After having had this rather unpleasant experience, neither of the patients returned to the hospital for further treatment.

I should like to ask Dr. Lynch whether he removes the apparatus after he passes the bronchoscope, especially when he has to rotate the head in examining the upper lobe bronchi.

The improved Lynch position of the semiflexion of the head in the examination of the larynx is very advantageous, but there is no advantage of suspension bronchoscopy over the other methods which are much simpler in technic.

Dr. Iglauer has brought forward in his paper one of the most difficult problems which we have in surgery. It does not matter how you cure a case of laryngeal stenosis, as long as you get the case well. That is all we are striving for. The voice, in the final outcome, has been far better in the cases cured by intubational dilatation than in those cured by laryngostomy. But when there has been extensive sloughing of the thyroid and cricoid cartilages and complete stenosis, laryngostomy is the only method indicated. You cannot get the larynx dilated from below or from above, and the method of Rogers to dilate the stenosed larynx by means of urethral sounds from the tracheal fistula upward will dilate the larynx, but considerable force is necessary and often an esophageal false passage is the result. If you attempt to forcibly dilate from above downward you invariably have a false passage as a result, and the case may succumb from mediastinal infection. Laryngostomy is by far the safest and best method of curing this type of case. As far as the string is concerned, I agree with Dr. Mayer that it is a very bothersome thing to leave in the mouth and may also be a source of danger, for the child can easily remove the tube by constantly tugging at the string with the tongue. This is, however, impossible with the anchored tubes of Dr. Iglauer.

In cases who have recovered from acute laryngeal diphtheria the tube has often been detubated by the tongue of the child and may be in the esophagus and is noticed only at the time the nurse finds that the child has difficulty in swallowing, while the child has been breathing quite naturally during this time and the tube thought to be in place. If the string must be left on the tube, it is far better to bring it out by means of a small catheter through the nares and attach it to the side of the face. This causes no discomfort, and the child cannot remove the tube with the tongue.

Dr. Fielding O. Lewis, Philadelphia: I was especially interested in Dr. Iglauer's paper, and it has been my pleasure during the last year to have four of these cases operated on

by the method of Dr. Jackson. I have some drawings which show three of these cases before and after operation, and wish to present Dr. Jackson's laryngoscopy tube with the rubber extension which I have used in all these cases, the advantage of which is that it prevents the formation of a tracheal spur between the tracheotomy tube and the extension, whatever it may be, above. It also permits breathing through the tube, the upper part not being completely closed.

DR. JOHN W. MURPHY, Cincinnati: Before Dr. Iglauer devised this method, as we usually worked together, we had a good deal of difficulty in getting these cases so that they could leave the hospital. They were with us for months at a time. In several of these cases, and the one which he mentioned, too, there was absolutely no opening from the upper part owing to the patient's having worn a tracheotomy tube until the upper part of the larynx had closed, so that even a filliform bougie could not be passed. By means of a fine sound, however, we succeeded in getting a minute opening through this membrane. It is not safe to attempt to enlarge the opening with any instrument. We find that the moment we can get the finest probe through and carry a string down and draw the tube up, we take much less risk of doing damage, and by this continuous method of dilatation we get much more satisfactory results than by any other.

The method of Dr. Lynch has been employed sometimes by me since I saw him use it, about a year ago. I find it simpler and very much more comfortable to the patient.

DR. GEORGE F. COTT, Buffalo: I had the same experience as Dr. Beck. In my case the patient had difficulty in breathing. I put him under ether and tried to introduce the bronchoscope and found that I could not put the head back far enough. The next day he told me that he had ankylosis of the vertebræ of the neck. That is a thing that does occur now and then.

DR. WOLF FREUDENTHAL, New York City: It seems to me that the method of Dr. Lynch is a great improvement over the old one, yet I am not ready to give up the original Killian method with the head hanging down, for a certain class of cases. I operated with suspension laryngoscopy in a tuberculous case in which any effort on the part of the patient was not desirable on account of hemorrhage. For this class of

cases the new modification is really excellent, but we encounter cases in tuberculous patients which do not go as you want.

Dr. Robert C. Lynch, New Orleans: I want to correct a wrong impression on the part of Dr. Cott. Cases of the acute type would get well sometimes, and when the child was recovering from the stenosis lesion the tube could be easily coughed up without anyone knowing of it. We recently had admitted to the hospital a child that had had a tube put in by a specialist. The child was then sent to the hospital, and when he got there the tube was stuck to the side of the mouth. He was cyanotic. One of the house staff pulled the string and found the tube was probably in the stomach. The child can cough the tube out when the stenosis is subsiding without there being any evidence of it.

Dr. Harmon Smith, New York City: A few years ago Dr. Lynch reported no recurrences after removing papilloma, and I thought that he had solved this problem. It would be interesting to know whether the growths were single or multiple, and whether single or multiple in children or in adults, because I think that the class of growth materially affects the problem of recurrence. In the multiple variety in children the more they are interfered with the more they recur, and even after all methods have been tried the tracheotomy tube for a long length of time is, I think, one of the safest modes. Secondly, the removal of a growth in an adult and its nonrecurrence does not assure us that after removing a papilloma in another adult it will not recur. Papillomata vary in type, in malignancy and in tendency to recur, and from the pathologic standpoint you are unable to deduct whether or not the tumor will recur. Another point that I should like to have brought out by Dr. Lynch, is whether he has ever employed fulguration alone, because, with the suspension, as he employs it, the surface of the larynx can be made as dry as the face, and I have always contended that if you can dry the surface of the papilloma in the larynx and can be sure that it will remain dry during the fulguration, the fulguration will overcome it—except in the multiple variety in children.

CLOSING DISCUSSION ON SYMPOSIUM.

Dr. Chevalier Jackson, Philadelphia: So far I have used the method presented only in cases in which it promised ben-

efit to the patient, directly or indirectly, for localization or therapeutic effect. It remains to be determined whether or not we may expect benefit to chronic bronchitis, pulmonary abscess and other lesions. I used dry powder, and it was coughed out completely in twenty-four hours. Possibly other preparations might not be so readily gotten rid of. I hope Dr. Arrowsmith will try to devise a way of getting the dry powder or some suitable preparation down through the larynx without having to pass the bronchoscope. The method then would be of general application by the roentgenologist. Localization, individual variation, bronchiectasis, abscess and other pathology could be readily demonstrated.

The treatment of obstinate tracheal stenosis has been a hobby with me for many years. The method developed by Dr. Ellen J. Patterson and me gets the patients well. Our experience coincides precisely with that of Dr. Lynah as to the indications for laryngostomy. Our experience also coincides with that of Dr. Mayer and Dr. Iglauer in regard to the use of another method when one method does not succeed. In laryngostomy the operation is of less importance than the after care. Too many cases are reported too soon. Dr. Patterson insists on a period from one to three years before doing the plastic operation for closure of the laryngostomic opening. One of our patients who lives in Chicago was recently sent to Dr. Beck for plastic closure, and I think he can testify to the widely open larynx obtained by the method devised by Dr. Patterson and me.

DR. ROBERT C. LYNCH, New Orleans: In response to the question of Dr. Lynah as to whether we removed the suspension in bronchoscopy, especially in work on the upper bronchi, I would say that it is preferable in these cases to do the bronchoscopy without suspension, the apparatus being used for the simple passage through the vocal cords. When it has entered the trachea, the suspension has served its purpose, and the rest is better done without the suspension apparatus being in situ. The only exception is where there are multiple foreign bodies, when it is necessary to introduce the tube several times, and retention of the apparatus will save the traumatism induced by passing the apparatus through the larynx of an infant or young child.

Replying to Dr. Smith, all of these cases were put in this appendix on the recurrence of papilloma after dissection purposely to contradict my statement made at first, when I reported sixteen cases of papilloma of the larynx removed by the dissection method without recurrence. I had had no experience with recurrence up to then, but since then the cases have increased, and my knowledge in proportion, and we have had these five recurrences after dissection by means of suspension. I reported that particularly to contradict my own statement that there were no cases of recurrence.

The cases were all multiple. They were all in children, and I brought out the point that they recurred after some inflammatory attack in three instances, and without reason in two. I have used fulguration, and believed that in the multiple cases possibly it is better than dissection. Recently I have been drying the papilloma by swabbing the surface first with alcohol and blowing in compressed air to dry out the water that is in the papilloma and then fulgurated it.

DR. SAMUEL IGLAUER, Cincinnati: As a matter of fact, I do not always leave the string in the mouth, but I find that it takes a little time and trouble to depress the tongue and find the tube by the ocular method. The question is, How sharp are the teeth? We have one little fellow who has very sharp teeth, and he usually chews through the string. As far as the tube's being coughed up and getting into the esophagus is concerned, that is impossible in this method, because the tube is anchored below. I find that by leaving the string in the mouth it is easy to make the change when I want to put in a fresh tube. I think that we should devise all methods we can to facilitate treatment, because no matter what method is used, the chief things are persistence and patience. If you can save the time in your daily work, it counts, both for yourself and the patient.

So far as I know, there has been no spur formation. When one uses the intubation tube, one can work the rubber covering downward on the posterior lip of the tube, and that prevents the formation of a spur.

As for laryngostomy, there is no objection to it in special cases, but if one can treat a case without splitting the larynx one is better off.

The Activities of the Subcommittee of Otolaryngology, Section of Surgery of the Head, Surgeon General's Office.

CHARLES W. RICHARDSON, M. D., CHAIRMAN.

This committee, consisting of Dr. Richardson, Dr. Shurly and Dr. Mosher, presented to the Surgeon General the resolution of the societies they represented as to the need of establishing a division of the Medical Corps of the Army and Navy, to assume charge of injuries of the head and air passages and the diseases of the eye, ear, nose and throat, acquired in service, in addition to making special examinations of aviators and the employment of hospitals and their staffs for this purpose.

The Surgeon General of the Army promptly appointed Major T. C. Lyster as an adviser to the committee, and the Surgeon Geenral of the Navy appointed Surgeon G. E. Trible, and these two, together with the original committee, were subsequently appointed by the General Medical Board of the Council of National Defense as a subcommittee on the nose, throat and ear, of the Surgical Specialties.

This committee listed five thousand six hundred names of otolaryngologists, adopting the questionnaire already prepared by the Subcommittee on Ophthalmology. The lists were indexed by volunteer typists, the questionnaires addressed and mailed, and the replies disposed of, and a competent stenographer appointed.

Advisers in each State were appointed to cooperate with the committee as to the standing of individuals and their classification. All information was thus thoroughly catalogued.

Of 5,468 questionnaires sent, 2,014 replied, while 3,474 failed to answer.

The Subcommittee on Ophthalmology was combined with that of Otolaryngology for such purposes only as might be required, each still retaining its individual identity.

A request was made to the General Medical Board of the Council of National Defense that the Subsections of Laryngology and Otolaryngology and the Subsection of Ophthalmology should meet in joint session.

A request was made also for the addition of a Brain Surgeon to the Ophthalmologic Section, and an Oral and Plastic

Surgeon to the Otolaryngologic Section, thus completing the Division of Surgery of the Head. This request was also promptly approved by the Surgeon General of the Army.

Dr. William H. Wilmer was made chairman of the joint Section of Surgery of the Head. Dr. V. P. Blair and Dr. Bagley were made members of the subcommittees.

The Subcommittee on Otolaryngology was formally approved by the Council of National Defense on August 15, 1917.

The following activities for otolaryngologists have been established:

Suggestions for a one thousand bed hospital for the Surgical Head Section on the Western front abroad were presented to the Surgeon General and approved. The members of the subsection visited various large cities and addressed otolaryngologists to arouse their enthusiasm and gain recruits to the Army Medical Service; otolaryngologic instruments standardized; requirements for entrance into the Army as to hearing revised; tests for malingerers assembled; tests made to ascertain the value of ear protectors; plans for a special hospital and dispensary building in cantonments for the Section on Surgery of the Head; the activities of the subcommittee outlined and sent to the members of the national societies; the appropriate grade of the assignment of the various candidates in the Medical Reserve Corps was indicated by the members of the committee in the office of the Surgeon General; an accurate tab on the professional qualifications and character of each candidate for service was had; the assignments in otolaryngology at base hospitals and cantonments; a roster of men to be assigned in otolaryngology in base hospitals abroad (in preparation); a course of lectures at the cantonments by the Chiefs of the Otolaryngologic Staff ordered, the officer designated to deliver the lectures, subjects given for the lectures, and a list of the books for the library prepared.

Major H. W. Loeb of St. Louis was assigned to the office of the Surgeon General to prepare a War Manual of Otolaryngology.

Major B. R. Shurly resigned, and Major J. H. Bryan was

nominated by the Council of the American Laryngological Association to the vacancy. This was approved.

Major Mosher was ordered abroad on an inspection tour with Lieut.-Col. Lyster, and Major Richardson to temporary duty in the Surgeon General's office.

Exhibits are presented indicating the various subdivisions of the Surgical Service approved by the Surgeon General. Finally, Col. Richardson presented a report on the proposed reconstruction of the defects on hearing and speech as a result of casualties in war.

This exhaustive and comprehensive report is accompanied by exhibits in detail.

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